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THE PHILOSOPHY OF HUMAN NATURE

University of Florida 1853

JOSEPH BUCHANAN, 1785-1829

From a Painting by M. H. Jouett

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ROBERT I. WATSON
General Editor
University of New Hampshire

THE
PHILOSOPHY
OF
HUMAN NATURE
(1812)

BY

JOSEPH BUCHANAN

A FACSIMILE REPRODUCTION

WITH AN INTRODUCTION

BY

THOM VERHAVE

GAINESVILLE, FLORIDA

SCHOLARS' FACSIMILES & REPRINTS

1969

SCHOLARS' FACSIMILES & REPRINTS
1605 N.W. 14th Avenue
Gainesville, Florida, 32601, U.S.A.
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SBN 8201-1064-7

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INTRODUCTION

The treatise here offered in facsimile is the major work of Joseph Buchanan (1785-1829), a generally unknown thinker during his lifetime as well as today. Obscurity, however, does not of necessity imply a lack of significance. If Isaac Woodbridge Riley (1907) is correct, Buchanan formulated not only "the most systematic presentation of the case in behalf of materialism that the country has yet afforded" (1958 ed., p. 379), he may also "be called the earliest native physiological psychologist. However imperfectly expressed, there were in his work certain adumbrations of modern doctrines—in sensation, a presentation of the nerve-tract thory; in cognition, an emphasis on the genetic; in volition, an approximation to the law of kinaesthetic equivalents" (*ibid.*, p. 395; I. W. Riley, *American Philosophy: The Early Schools.* New York: Dodd, Mead, 1907; reprinted by Russell and Russell, New York, 1958).

As these comments indicate, the work should be of interest not only to the historians of philosophy but also to those interested in the history of psychology. Anyone who has some familiarity with contemporary psychology must be struck by the extent to which the author expresses views which are now more or less commonplace.

Because of the general obscurity of the author, it appears warranted to present a brief biography of Buchanan's not uneventful life. The most circumstantial account was written by his son, Joseph Rodes Buchanan (1814-1899), and was published by Lewis Collins in his *Historical Sketches of Kentucky* (pp. 559-560; Maysville: L. Collins; also Cincinnati: J. A. and V. P. James, 1847). It appears in an Appendix on "Science and Literature in Kentucky" in the 1847 volume and was reprinted by L. and R. H. Collins in their *History of Kentucky* (vol. 2, p. 218; Covington, Kentucky: Authors, 1874). See also *The National Cyclopaedia of American Biography* (New York, 1909; vol. 10, pp. 277-278). Since all subsequent accounts seem to be largely based on this rather inaccessible sketch, it is here reprinted in full.

"DR. JOSEPH BUCHANAN, a philosopher, mathematician and mechanical inventor, was born in Washington County, Virginia, August 24, 1785, removed to Tennessee in 1795, visited Kentucky for the completion of his education in 1804, and spent the remainder of his life chiefly in that state, in scientific and literary occupations.

"His boyhood in Tennessee (on the Cumberland River) was spent amid the usual hardships of a frontier life and poverty, with but trifling opportunities of education. In 1802 he repaired to a grammar school near Nashville, where he spent five months; and by his remarkable proficiency astonished his class-mates and 'obtained the reputation of a great genius.' Having made as he conceived an important invention for mills, he wished to devote his attention to the execution of his invention, but upon a critical review of his plan, discovered a defect, and gave it up. In 1803 he returned to the Academy, and in the course of nine months mastered the Latin language, and distinguished himself by original composition. 'He was so fond of originality in all his essays, that he would not even condescend to write on any subject on which he had ever read anything.'

"In 1804 he was sent by his guardian Major Edmonson, to Transylvania University at Lexington, Kentucky. Rustic and diffident—enfeebled by intense study and a pulmonary fever—he passed for a simpleton, until his proficiency in mathematical studies again made him conspicuous. In studying Ferguson's Optics, he detected an error of the author in regard to the focal distances of lenses. His professor sustained the author and put him down by authority. When the weekly theses were handed in, Buchanan gave in, as his, the disputed proposition concerning the lenses, and proposed to render it sufficiently long by a demonstration on the black board. The professor, however, would not permit him to use the board and gain a mathematical triumph. During the vacation he published a mathematical pamphlet of 20 pages, demonstrating the sufficiency of gravitation for the celestial motions, and the incorrectness of 'the projectile velocity assigned by Newton.' In this, as usual, he relied upon his own genius, with but little assistance from authors.

"In 1805 he commenced the study of medicine with Dr. S. Brown; invented a new musical instrument, producing its music from glasses of different chemical composition; and originated the grand conception of the Music of Light, to be executed by means of harmonific colors luminously displayed. The invention has never been put into operation, but there can be no doubt that it would produce one of the grandest and most imposing spectacles ever witnessed by the human eye. To perfect his invention it was necessary to study music, colors, and the laws of vision; in doing which he discovered that Father Castel and the Darwins had anticipated the fundamental principles of his discovery, and this precluded his hopes of immortality. Nevertheless he read before the medical society an essay of 80 pages upon his discovery, strongly characterized by critical acumen and ingenious originality.

"To procure the means of finishing his education at Philadelphia, he removed to settle and practise for a short time at Port Gibson, Mississippi Territory. In 1807 he resolved to that place, where he spent eight months, suffered from the climate, practised his profession, and wrote a volume of 175 pages on the subject of Fever, with which he removed to Philadelphia. Professors Barton and Rush spoke highly of the style, ability, and ingenuity of his essay, and offered their friendly services. But being now destitute of resources, he could neither publish his work, nor remain in attendance upon the lectures; and in 1808 he walked out in 27 days to Lexington, Kentucky, and settled at that place, empty in purse, but improved in health. The degree of A.B. was soon after conferred upon him, by the University, at the instance of President Blythe.

"He now directed his attention to the medical department of Transylvania, which had only a nominal existence, there being but one professor, who gave no lectures. The Trustees co-operating with him, a regular Faculty was organized, and he received (in 1809) the appointment of Professor of the Institutes of Medicine, being then in his 24th year—five years from his arrival as a rustic student from the wilds of Tennessee.

"The fall of 1811 was fixed upon as the time for the opening of the medical session; prior to which he was engaged in preparing his lectures. Dr. Buchanan had, unfortunately, but little faith in the success of the enterprise—not expecting an efficient support from any of his colleagues but Dr. Overton, in whom he had the highest confidence. Nevertheless he prepared his lectures, and being wholly engrossed in writing and inventions, made no effort to obtain practice. When he abandoned the attempt to establish a school, he published his philosophical views (in 1812) in a volume of 336 pages, under the title of *The Philosophy of Human Nature*, of which a thousand copies were issued. This established his reputation as a profound thinker. It is a work of rare merit, and notwithstanding the subsequent progress of physiological and phrenological science (with the latter of which he was unacquainted), it is still a valuable and interesting book.

"Not long after this publication he determined with the advice of his friends to abandon the medical profession, and give his attention to introducing into Kentucky the Pestalozzian system of education. He visited Philadelphia to study the new system, as introduced by Mr. Neef, and spent some years in Pestalozzian teaching in Kentucky. But his indomitable mental activity withdrew him from this field, and in his 32d year he entered the profession of law, and delivered a course of law lectures to a private class; being meanwhile engaged in editing the *Reporter* and writing on other subjects; or, as he expressed it, 'wearing out my days in hard study without deriving much profit from it.' The principles of materialism inculcated in his *Philosophy* he reviewed in a masterly manner—showing that, without destroying the force of his former arguments, one might by a deeper analysis arrive at a system of universal spiritualism.

"Subsequently he took an active interest in politics, as a Jeffersonian democrat, a friend of Mr. Clay, and a supporter of the old-court party. He edited the *Palladium* at Frankfort; the *Western Spy* and *Literary Cadet* at Cincinnati; and the *Focus* at Louisville. The latter, which he projected in 1826, he edited until he died in 1829, leaving a wife and son (Dr. J. R. Buchanan, Professor of the Institutes of Medicine, &c., Cincinnati). He left behind valuable manuscripts and sketches of important mechanical inventions. In 1821-2 he constructed an extremely economical steam engine, which he successfully applied to the propulsion of the machinery of a factory, and to steam navigation on the Ohio. The invention was of some importance, from its economy of fuel; but it was found that the spiral tubes, which he substituted for boilers, became encrusted by the impurities of the river water; and hence were adapted only to the use of the pure fluid. From the superior lightness and efficiency of his engine, he supposed at first that it would be applicable to aerial navigation. An experiment, however, demonstrated that certain scientific facts upon which he had relied had been erroneously stated by English authors. In 1824 or 1825 he applied his engine upon land, to demonstrate its applicability to land carriage. The engine and wagon ran through the streets of Louisville in the presence of an astonished throng of spectators.

"His discovery of a new motive power, derived from combustion without the aid of water or steam, had a high degree of scientific plausibility, and it is to be regretted that he never attempted its execution.

"Dr. Buchanan was theoretically and practically devoted to education. He published at Louisville a grammar, very valuable for its simplicity, designed to facilitate the study of grammar by youth. His views of education were profound and enlarged—his methods admirable, and incalculably superior to those generally in vogue. His sanguine predictions were fully realized in the education of his own son, who was so rapidly advanced that by the age of twelve he was placed at the study of Blackstone's Commentaries; having previously mastered a course of studies embracing grammar, geography, history, arithmetic, algebra, geometry, surveying, astronomy, natural philosophy, chemistry, mental philosophy, political economy, and constitutional law. Similar methods of education, adopted since his death by the Rev. B. O. Peers, of the Eclectic Institute of Lexington, produced similar results. In competing for an educational prize, the pupils of Mr. Peers—little boys, such as we find in common schools engaged with their primer and first lessons—were seen gravely lecturing before the Kentucky legislature, in the statehouse, upon chemistry and natural philosophy, with illustrative experiments!

"The life of Dr. Buchanan affords an instructive moral. Simple in his manners and tastes, amiable in private life, elevated in his aims—full of philosophy and philanthropy—original and ingenious—ardent and enthusiastic, yet subjecting everything to the searching analysis of critical reason, he might have attained the highest rank in any pursuit upon which his energies had been concentrated; but cultivating his intellect to the neglect of other powers, he scorned the pursuit of weath; abstracted himself from society, lived in continual pecuniary embarrassment—abandoned the road to wealth whenever it ceased to present intellectual attraction and novelty—wasted his powers in desultory labors, lived and died comparatively indifferent to fame—and as soon as the depths of human knowledge had been sounded, and its novelties exhausted, became indifferent to all the other incentives of ambition."

Subsequent accounts have filled in a few details and verified certain aspects of the above biography. A bibliography of relevant references to articles concerning Buchanan, as well as further biographical material, can be found in the following:

James F. Adams and Arnold Hoberman, "Joseph Buchanan (1785-1829): Pioneer American Psychologist," *Journal of the History of the Behavioral Sciences* (1969), vol. 5.

Eugene H. Conner, "Chronica Medica Kentuckiensis," *Bulletin of the Jefferson County Medical Society* (March and April, 1967), vol. 15, pp. 16, 36; 18, 46.

Niels H. Sonne, *Liberal Kentucky: 1780-1828* (New York: Columbia University Press, 1939).

Thom Verhave, "Joseph Buchanan (1785-1828) and the 'Law of Exercise (1812),'" *Psychological Reports* (1967), vol. 20, pp. 127-133.

As Dr. Conner points out, "The critical and extensive biographical study which he deserves remains to be written" (1967, p. 46).

The astonishing range of Buchanan's interests and activities implies that his works and ideas are of relevance to many areas of endeavor: philosophy, psychology, medicine, jurisprudence, education, and the histories of invention and newspaper editing during the early part of the nineteenth century. The present work, his major one, was written when the author was a young man in his mid-twenties. Prepared initially for a course of lectures to medical students, it is written as a text, which may explain its brevity as well as its clearness of style and exposition. Previous discussions of this work (Riley, 1907 and 1959; Sonne, 1939; Herbert W. Schneider, *A History of American Philosophy*, 2nd ed., 1963, pp. 198-199) have analyzed its philosophical views and implications, as well as pointed out the major sources of influence on Buchanan's thought: Erasmus Darwin (1731-1802), David Hartley (1705-1757), David Hume (1711-1776), John Locke (1632-1704), Isaac Newton (1642-1727), and Johann Heinrich Pestalozzi (1746-1827).

There can be little doubt that the book is closely related to the development of materialistic thought in nineteenth-century America, and at least some of its importance and interest derives from this unorthodox emphasis. Most of its chapters, however, contain material presently considered mainly of a psychological nature. And it is as a psychological dissertation that the book may well be of greatest historical interest.

I previously quoted I. W. Riley's comments on Buchanan's psychology. It should be noted that these comments themselves are dated. Written near 1907, they reflect the influence of the then recent (1880-1895) rise of a "new" physiological psychology; see F. M. Albrecht, *The New Psychology in America, 1880-1895* (unpublished Ph. D. dissertation, Johns Hopkins University, 1960) and Edward G. Boring, *A History of Experimental Psychology,* 2nd ed. (New York: Appleton-Century-Crofts, 1950).

Since 1907, however, there have been further developments, such as the emergence of behaviorism; see John B. Watson, "Psychology as a Behaviorist Views It" (*Psychological Review,* 1913, pp. 20, 158-177); A. A. Roback, *A History of American Psychology,* rev. ed. (New York: Collier Books, 1964); and A. Tilquin, *Le Behaviorisme: Origine et developpement de la psychologie de reaction en Amerique* (Paris: J. Vrin, 1950). Later still was the development of modern learning theory, as set forth in the writings of W. N. Estes, S. Koch, K. MacCorquodale, P. Meehl, C. G. Mueller, Jr., W. N. Schoenfeld, and W. S. Verplanck, *Modern Learning Theory* (New York: Appleton-Century-Crofts, 1954).

Considering these more recent developments, Buchanan's views on learning and education are directly relevant here. This is not the place for a detailed discussion or comparative analysis. It is clear that Buchanan belongs to the so-called associationist tradition, of which David Hartley's

Observations on Man (1749) was a major representative; see H. C. Warren, *A History of Association Psychology* (New York: Scribner's, 1921). It would be unfortunate, however, if preconceived opinions generated by traditional cliches and labels, such as associationism and materialism, would prejudice the reader against examining Buchanan for himself. A reading of Chapter 8, "Concerning Association," and Chapter 9, "Of Ideas, Their Associations, and Abstraction," will clearly indicate the historical connections between eighteenth and nineteenth-century associationism and contemporary "learning" or "behavior theory"; see John F. Hall, *The Psychology of Learning* (Philadelphia and New York: Lippincott, 1966) and G. A. Kimble, *Hilgard and Marquis' Conditioning and Learning,* 2nd ed. (New York: Appleton-Century-Crofts, 1961).

If the foregoing discussion arouses the reader's curiosity, it can easily be satisfied. The author is quite capable of speaking for himself in a lucid style, uncommon for his period. Brief and always to the point, the next pages are his. If the present reissue of his forgotten work helps to arouse further interest in other native American contributions to philosophy, psychology, and science in general, we may some day have a better appreciation of a generally neglected but most admirable heritage.

THOM VERHAVE

Queens College
City University of New York
Flushing
February, 1969

THE

PHILOSOPHY

OF

HUMAN NATURE.

BY JOSEPH BUCHANAN.

"Man too is the subject, on which the practical moralist and enlightened statesman have to operate."——*Stuart.*

RICHMOND, K.
PRINTED BY JOHN A. GRIMES, MAIN STREET.

1812.

United States of America,
District of Kentucky, } *sct.*

BE IT REMEMBERED, that on the third day of April, in the year of our Lord 1812, and in the thirty-sixth year of the Independence of the United States of America, *Joseph Buchanan*, of the said District, deposited in this office the title of a Book, the right whereof he claims as author, in the words and figures following, to wit:

" The Philosophy of Human Nature, by Joseph Buchanan. " Man too is the subject, on which the " practical moralist and the enlightened statesman " have to operate."—STUART."

In conformity to the act of Congress of the United States, entitled " An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the terms therein mentioned ;" and also, an " act supplementary to an act, entitled an act for the encouragement of learning, by securing the copies of maps, charts, and books to the authors and proprietors of such copies, during the terms therein mentioned, and extending the benefits thereof to the arts of designing, engraving and etching historical and other prints."

JOHN H. HANNA, Clk.
Kentucky District Court,

TO MAJ. WM. EDMONDSON,

MY NEPHEW AND FRIEND,

To whom I am indebted for the

INTELLECTUAL IMPROVEMENT,

Which has enabled me to write

THIS WORK;

I inscribe the first production of my Pen,

WITH GRATITUDE AND RESPECT.

J. B.

PREFACE.

WHEN a book is received with great applause by the public, every person who reads it, has a curiosity to learn the history of its composition, and of the author who composed it; and the gratification of this curiosity may be the object of an interesting preface. But the conceited and sanctimonious remarks of a dull writer, respecting himself and his productions, are always read with disgust. A new author, who would not too confidently anticipate the approbation of the public, should hence be very modest and brief on these prefatory topics. On the present occasion, however, I will hazard some remarks of this kind, with which I think it necessary that the reader should be acquainted.

When I commenced the practice of physic in Lexington, I contemplated the establishment of a medical school in the Transylvania University. The Trustees of that institution were accordingly induced to organise and appoint a faculty of physic, in which they made me Professor of the Institutes of Medicine. To discharge the functions of this office completely, I thought it necessary to commence with a metaphysical investigation of human nature: and with this view, I prepared a series of appropriate lectures. On reviewing them, after the contemplated school had miscarried, it appeared to me, that they contained original matter, which ought to be communicated to the public; and as I had now determined to relinquish the unprofitable pursuits of literature and science, for others more humble and lucrative, I readily concluded to publish, without attempting to mature them into a system more perfect and complete. With some additions and improvements, they form the chapters of the present treatise.

It may be proper to inform the reader, that the latter part of this work is the most original and interesting.

The authors from whom I have borrowed most, are Locke, Hartley, Hume, and Darwin.

I would also observe, that there are some faults in the style, which I have not attempted to correct. I have taken the liberty of using the auxiliaries *shall* and *should* for their cotemporaries *will* and *would*, when harmony seemed to require it; and I have often used the possessive *whose* in the neuter gender. But a more serious imperfection is the want of logical accuracy in the use of technical terms, and in the general phraseology of the work. It has been objected to Locke, that he frequently confounds the object, the idea, and the term to express it. The same fault will sometimes be found in this treatise. A more frequent transgression of logical accuracy in style, is that of speaking actively on subjects on which a passive theory is maintained. My apology for all these imperfections, is the difficulty, perhaps impossibility, of combining logical accuracy with any degree of elegance, when writing on a profound science, in a language that has not been constructed for the use of philosophy, but for the common transactions of life, and in conformity to the first crude reflexions of the human mind. The precise signification of words, in every kind of composition, is principally determined by the context, and the meaning of the whole sentence in which they occur. By proper attention to these, it is presumed, that the precise meaning of the author in the present treatise will always be sufficiently evident. Technical terms are explained in the appendix.

I would gratefully acknowledge my obligations to the public for the liberal subscription I have received. I feel particularly indebted to the following gentlemen for their services in this respect, viz. A. Montgomery, M. D. S. E. Watson, Esq.—John Todd, M. D.—James Hickman, Esq.—T. C. Graves, Esq.—Chilton Allan, Esq.—Dr. A. W. Rollins—Benj. Warfield, Esq.—Dr. A. M. Edmiston—John Green, Esq.—John Harney, M. D.—Th. Washington, Esq.—Maj. Wm. Edmondson—Dr. W. Wilmot—Capt. T. C. Howard—Dr. M. Q. Ashby—and Boyd M'Nairy, M. D.

THE AUTHOR.

Richmond, April 12, 1812.

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THE PHILOSOPHY &c.

CHAPTER I.

AN INTRODUCTORY DISQUISITION CONCERNING THE NATURE OF MIND.

I. THE method most proper to be pursued in the cultivation of any branch of philosophy, is now very generally understood, and is commonly followed with considerable care, by the devotees of science in the present age. It is the method of induction: which requires us ; to take an accurate and comprehensive survey of the facts presented to our senses in that department of nature which we purpose to investigate ; to compare those facts together, and from their relations of agreement and repugnancy, to class them under general heads ascertaining other facts less obvious but more extensive in their operation ; and, by repeating the same process on these, to deduce others still more universal, until we have developed the most comprehensive and recondite principles which our minds are able to apprehend.

THE course which we naturally incline to pursue, is very different. The toil required to complete an ample induction, is repulsive to the indolence of our nature, nor do we readily perceive the necessity of undergoing it. When our curiosity is excited, we vainly assay to penetrate by intuition, the most profound recess in nature; and expect to comprehend her most intrinsic principles and springs by direct meditation. Through a long series of ages, the inquisitive part of mankind pursued this delusive course; and even in this experimental age, we often meet with hypothetic systems predicated on partial views and hereditary prejudices.

THE question I would now discuss, concerning the intrinsic nature of the mind, is much too deep to be decided by this deserted way of mere inspection. There is, perhaps, no question in philosophy which requires an ampler view of facts, or more profound induction from them; for it respects the most intrinsic constitution of all the natural objects of human knowledge. In the present state of science, we cannot reason on a scale commensurate with the magnitude of such an inquiry. But the subject is so interesting, and its decision would be so important in metaphysical science, that, unable to investigate it by the proper method, I will presume to discuss it in that imperfect way, which, though inconclusive, is most congenial to our common prejudices and propensities. I will state my theory, and subjoin the arguments which have induced me to embrace it; carefully avoiding, however, to make it the basis of any doctrine subsequently maintained in the course of this work.

II. On the nature of the mind, philosophers have formed but two opinions; nor does the subject seem to furnish us the smallest grounds on which we could erect another. By one it is affirmed; that the human mind is an independent spiritual existence, mysteriously connected with the human body; whilst the other contends, that mind is merely an organic state of matter, such as constitutes the human brain. The latter theory appears to me most rational; most consistent with the separate attributes and qualities of mind and matter, and with the facts displayed conjointly by them in the human system.

The generality of men have assented to the doctrine of spirituality with the firmest assurance. A simple glance at the most obvious properties of matter and mind, discovers a striking dissimilarity between them. An ordinary enquirer, seizing on this superficial dissimilarity, and feeling much pride and interest in elevating himself to the rank of a spiritual indestructible being, concieves that he has discovered a fact which demonstrates his hereditary opinion; and he thence adheres to that opinion with a degree of confidence which cannot listen attentively to contravening arguments. But I think it easy to convince any reasonable person, that the question cannot be so positively decided. Our notions of matter and of mind are both relative and imperfect. We obtain them merely by inference; not by direct perception. By our senses we percieve certain qualities, extension, solidity, figure, co-existing in nature, and we refer them to an unknown substratum, called matter, a connective substance in which we suppose them to inhere. By consciousness, again, we apprehend certain operations, feeling, thought, volition, transpiring in ourselves, and we refer them to an unknown substratum, or connective medium termed mind. Being thus unable to acquire a direct and complete knowledge of either mind or matter, we can neither positively decide that they are radically the same, nor that they are radically different. Induction alone, from a proper collection of facts, can enable us to decide ; nor can it, in the present state of natural science, afford more than a probable conclusion. It becomes us therefore to proceed in this investigation with a distrusting humility of mind, suitable to the uncertain issue of such an abstruse and complicated question.

III. A POPULAR and plausible argument against the doctrine of materialism, is derived from the hasty detractive opinion which the uninquisitive are ever ready to entertain concerning matter. Merely observing its most obvious properties, their unprying minds decide instantaneously, that it is too sluggish and inactive ever to display more than mechanical effects, being wholly unequal to the activity and subtleness of mental operations. A very different conclusion I am confident is drawn, by every candid person who experimentally investigates the intrinsic properties of matter. Even an attentive observation of the ordinary events in the material world, might convince the most unlearned in science, that physical agents possess energy, subtleness, and celerity of action, in a degree which the imagination itself cannot magnify. The force and velocity of motion in this ponderous globe; the effects of fire, from its plastic influence on vegetables and animals, to its destructive ravages in the conflagration of cities, and in volcanic eruptions; all the phenomena of wind and rain, from the gentle breeze and refreshing dew, to the boisterous and wasteful hurricane; the incalculable celerity and force of lightning; the astonishing quickness and accuracy of motion in light; the silent and imperceptible growth and decay of vegetable and animal bodies: all these are obvious and impressive instances of physical agency, whose very existence we deny, when we attribute original activity, exclusively to that little viewless something called the human mind, and affirm that matter is merely a mechanical and passive substance. But the discoveries of the chemists and other experimental philosophers, are more apposite to this point, and more conclusively demonstrate the intrinsic activities of the material world. These investigators, by analysing portions of matter which to our senses appear the most inert, are able to develope elements which prove singularly energetic and active. From a piece of limestone. for example, they will extract a kind of air, which is immediately destructive to human life; and prosecuting the analysis farther, they develope a substance so inflammable, that it is almost impossible to preserve it from spontaneous combustion. A thousand instances like this might be recounted.

A REVIEW particularly of Mr. Davy's chemical discoveries, made by means of electricity, is sufficient to convince us, that every material particle in nature, is essentially active. Instead of concluding from his experiments, that matter is intrinsically passive and incapable of original activity; I am ready to believe, that the inert mass perceived by our senses, is composed of elements which might properly be called SPIRITUAL ENERGIES, capable of acting on each other so as to display the most singular and inscrutible appearances; and in combination exhibiting the mechanical properties of solidity, mobility, extension—I consequently cannot hesitate to believe, that the elements of matter possess active powers adequate to any celerity and subtleness of action in the human mind.

IV. THAT regular and almost imperceptible gradation, which occurs among natural bodies, with respect to the complexity and perfection of their structures, is a fact scarcely reconcilable to the doctrine of spirituality, but perfectly consonant with the organic theory of the mind.

A BLOCK of marble is one of the most simple inorganic substances in nature. It appears to the senses completely inert, and mechanical in its properties. The man of genius, on the contrary, is the most complicated and perfectly organised body with which we are acquainted. Between these two, the marble and the man, which are placed at the opposite extremes of nature, there is a regular series of other bodies, differing insensibly from each other in their obvious properties. These have been distributed into three great classes, the mineral, the vegetable, and the animal kingdoms; but the precise limits of each cannot be defined by the naturalist. Minerals rise by insensible degrees into vegetables, and these again into animals—and the different kinds of animals ascend above each other in an unbroken gradation to the perfection of man. The greater part of this ascending series of beings we know to be wholly material, and to be varied in their characters by a variation of organic structure. We may thence rationally conclude, that the whole series is entirely material, and that the superiority of the animal extreme, proceeds merely from the greater perfection of its material organization. And this conclusion will be perfectly consistent with the regularity of the gradation: for the elements of matter are capable of combining together in an infinite variety of forms which are changed into each other, like the colors of the solar spectrum, by unnoticeable variations.

The spiritualists would persuade us, that although we find nothing but matter at one extreme of the series, yet that we find at the other, a substance totally different, a spiritual intellect, combined with it, which gives to man his superiority and perfection. According to this theory, we would expect to find a chasm in the series, a long interuption in the chain of beings where intellect is first combined with matter. If intellect be indeed a spiritual intrinsically active substance, directly the reverse of matter, it appears impossible, that the body or system of matter with which it is combined, should not differ in the most obvious and striking manner from every mere material structure. As great a difference as we find between a mineral and a man, in such a case would certainly appear. But we can find no being so distinct from all the rest of nature's works: there is none which does not interlock with others so as not to leave a calculable difference between them.

THE spirituality of the mind being thus so inconsistent, and the organic theory so accordant, with the order and connexion which nature has displayed in the structure of all her works; we might from this single view reject the former from the science of the mind.

V. SOME of the spiritualists have argued, that the proofs for the existence of mind, are more positive than those for the existence of matter. By our senses, say they, we perceive the properties of matter, and from them infer its existence; by consciousness again, which is entitled to more credit than the senses, we learn the attributes of mind, and thence with greater certainty, infer its existence—and the attributes of each being different, they conclude, that the things themselves must also be different. There can be nothing apparently more clear and conclusive than this argument as far as it extends; but it is not perfectly solid nor does it reach the depth of our present inquiry. That there is something in man, which is properly denominated mind, and that it is *proximately* different from matter, is not disputed by the materialist. When he affirms, that mind is material, he does not mean, that the words matter and mind should be synonimous terms; but that the ultimate principles of the objects they indicate, are the same. His theory maintains that mind is an *organic state* of matter; a peculiar combination of material elements, capable of displaying the attributes of intellect: and surely nothing can be more different from the elements of matter themselves, than the particular MODE of their composition which is proper for intellectual operations. This argument then perfectly accords with the organic theory of the mind; and being farther pursued will furnish strong presumption of its truth.

THE same senses and consciousness which prove to us the existence of a mind proximately different from matter; prove also that it is unknown to us as an independent existence. Relying on the evidence of sense, we believe that matter is a distinct, independent, and indestructible existence; but we have no knowledge of similar properties in mind. On the contrary it appears to be itself an attribute of matter: for we find it constantly combined, or co-existing, with certain forms of that substance; and never in a separate state. This consequential difference between them, is constantly confessed by all mankind: for thousands every day *declaim*, to prove the soul's survival of the body, whilst not an individual in an age denies, that matter has an independent being,

VI. IF we prosecute this view of the subject still farther, we shall find it lead to proofs still more conclusive. Extending our observations on mind, whose existence, proximate difference from matter, and constant connexion with it, have been remarked; we shall perceive, that the conditions of this connexion with certain organic states of matter, amount to an actual subordination and dependence. Those very acts and attributes of mind, from which we have inferred its being, cannot be exercised without concurring actions in the conjoined organic substance. Perception, feeling, thought, volition, have never been performed by any mind without a simultaneous, correspondent operation in the brain where it resided: and the mental act, in those cases which admit of a developement, and probably in all others, proves to be secondary and consequential to the physical. The mind itself must therefore be subordinate and dependent—not the primary agent using the organic matter merely as a convenient instrument in its transactions.

THE rise, vigor, and decay of the human mind, follow, with great certainty, precisely the same events in the natural history of our physical systems. In infancy the imperfections of the intellect, its want of strength and disciplined activity, are equally conspicuous with the weakness and undisciplined actions of the body. As the latter increases in size, acquiring strength of muscle, with regularity and amplitude of motion; the former also is enlarged in its powers, and improved in its modes of exertion. They rise together, and at the same time reach the period of perfection. They next progress through the vigorous age of manhood, mutually displaying their natural endowments, and their artificial accomplishments of education: and they finally decay, and sink together, under the destructive weight of years. If any deviations from this regular and correspondent progress of the mind and body through life, have been observed, they are easily explained by referring to the unequal operation of various causes on the brain and other parts of the human system. The brain is the seat of intellect, and the part on which it is dependent: whatever influence then, moral or physical, operates on this with more or less effect, than on the system generally, must produce a corresponding difference in the progress of the mind and body. But these irregularities do not invalidate the general fact. Some men retain their mental powers in great perfection to the latest stage of life; yet age as certainly impairs and dissipates our intellectual as our corporal powers and qualifications. The natural circumstances, and the common transactions, of human life, tend more to cultivate the mind, than to cherish and discipline the body; and hence the former does oftenest improve and flourish late in life: but this unimportant difference between them, has often been extremely magnified by the influence which a sentimental prejudice exerts on our opinions.

According to the observations of many ingenious men, the external form and internal texture of the brain, are very important circumstances to the intellect it embraces. If that intellect were purely spiritual and intrinsically active, it is very improbable that these trivial circumstances in the mere instrument of its operations, could make an important difference in its powers: but if mentality be only an attribute of the living brain, it is then to be expected, that a different proportion of parts in that organ, or a slight variation in its intrinsic structure, would produce the greatest difference of intellectual powers which occurs among men. The fact then, as stated above; that the various degrees of intelligent power observable among men, and other animals also, may be traced to varieties in the formation and texture of their nervous systems; is no inconsiderable argument for materialism.

Whilst nature is permitted to proceed in her regular and customary course, displaying her events in a smooth harmonious train, it is with great difficulty that we can ascertain her latent springs of action and principles of order. But when her smooth and silent regularity is interupted by an experimentalist, or the occurrence of an accident, her novel situation frequently displays her energies and laws to common observation. This truth has often been exemplified in the subject of this article. Although the common facts already noticed, clearly prove the mind to be dependent on the brain; yet that dependence, and the total want of intellectual power in any other part or principle of man, is more directly proven by the effects of accidents on that organic substance. Every disease which affects the nervous system, particularly the brain, affects proportionally the functions of the mind. Delirium, melancholy, and madness, are as completely intellectual, as the exercise of moral sentiment and rationality; yet they arise in every instance from diseases of the brain; nor is it possible to avert them, when the physical misfortune supervenes. The febrile paroxysm which falls with force upon the brain, reduces the greatest powers of genius to the weakness and confusion of delirium, with as much certainty as the destruction of the head destroys our animal life.

THE most decisive fact which has occurred to me, is the stupidity of mind produced by pressure on the brain from fractures of the skull and other accidents. A degree of pressure much too light to hurt the texture of the parts, locks every mental faculty so fast, that not the slightest intellectual act can be performed. This proves to me, that there is no spiritual mind in man, possessed of an original activity, able to feel and think within itself, or to commence thought, sentiment, and motion; but that all our intellectual transactions originate in the activity of the brain. It may be said, that the mind has an intrinsic power of action, which cannot be displayed without the use of its material organ; but such a power is wholly hypothetical: nor is it plausible, that an immaterial agent intrinsically active, could not perform a spiritual act peculiar to itself, nor even make one conscious effort to perform it, without the agency of matter.

In perception material agency is obviously essential; for we can neither perceive without the activity of sense, nor during that activity refrain from doing it. The preceding facts and arguments prove also, that the agency of the brain is equally essential in abstract thinking. It therefore seems to be demonstrated, as fairly as the nature of the subject will admit; that the mind, which the spiritualists maintain to be an immaterial, intrinsically active, and independent being, whose actions constitute our feelings, thoughts, volitions; is at the same time the mere creature of the brain, entirely incapable of originating and performing independently, these peculiar acts which should characterise its nature. I would therefore conclude that no such mind exists.

If it be proven, as it now appears to be, that the intellectual transactions of feeling, thought, volition, made known to us by consciousness, correspond as their shadows to the physical transactions of the brain discovered by our senses; may we not conclude, that they are identically the same things perceived by us in different ways, and thence thought different? We are authorised at least to prosecute the study of human nature as a physical science, confining our metaphysical inquiries to the vital organization of the brain; for what is true of this cannot be false concerning mind, of which it is the archetype.

VII. If all these arguments were sophistical, and the doctrine of spirituality did accord as well with facts as the organic theory; yet that doctrine is darkened by a mystery, for which alone we might reject it. How a spirit can be connected with a mass of matter, so that they shall mutually act upon each other, is a question of which no one can even fancy a solution. Nor is this merely a mystery, an inexplicable fact; it is also philosophically absurd. To suppose that two substances, mind and matter, which are so essentially and totally dissimilar, that they have no common properties, can be so connected as to operate on each other, is inconsistent with all the analogies of nature, and entirely incomprehensible. Nor is this the whole amount of the absurdity. According to the spiritual theory, mind and matter operate on each other, without possessing any common properties; yet two minds, whose natures are congenial, and all their qualities similar in every respect, are wholly incapable of a direct reciprocal influence. Peculiarly adapted for direct intercourse, they choose to communicate circuitously through a medium on which they seem unqualified to act. If intellects combined with matter should be obliged to use it in all their operations; yet that, which death has freed from the incumbrance of a material organ, might surely still affect one less advanced, and thus teach at once his spiritual nature and immortality to man. Such are the mystery and absurdities connected with the spiritual doctrine of the mind.

VIII. An argument on which the spiritualists rely, as conclusive on their side of the question, is the apparent difference between the properties of matter perceived by the senses, and the attributes of mind made known to us by consciousness. We have already noticed and opposed this argument in different shapes.. We have already endeavored to prove; that the knowledge of matter gained by sensitive inspection only, is superficial and inadequate; that a deeper scrutiny developes energies and operations which prove it able to perform the quick and subtile acts of intellect itself; and that the apparent difference, can only indicate the proximate, which the materialists allow. It has also been hinted, that the physical action of the brain which corresponds to thinking, may be identical with it; their apparent difference proceeding from our different modes of apprehending the same event—an opinion perfectly consistent with the common doctrine of consciousness and the organic theory of the mind. Perception, according to this theory, is an action of the the living brain excited by the external object to be perceived; and if consciousness be a distinct action of the mind by which it apprehends its own transactions, it must also be a peculiar action in the brain excited by another in the same organ. The physical actions then of consciousness and perception in the brain, being thus produced by causes totally different, must necessarily be themselves distinct and different. But one of them constitutes our knowledge of matter, and the other our knowledge of mind: these objects then must seem to us entirely different, though only proximately so in nature.

To make this point still plainer—the action of the brain, excited by a material object, which constitutes our perception of matter, must necessarily be different from that secondary action, excited by the former, which constitutes our consciousness of thought. The act of thinking in the brain, perceived as a physical event by our senses, must therefore seem to be a thing entirely different from the same act apprehended by our consciousness. The apparent opposition, and the proximate difference, of mind and matter, are thus not only consistent with the organic theory; but necessary consequences of it and the common doctrine of consciousness. And if our speculations in the next article be not too subtile and refined, we shall see that the evidence of consciousness, when she is rightly understood, is yet more strong—unanswerably strong for materialism.

IX. We have been conceding to the spiritualist, that the act of consciousness, which apprehends our intellectual attributes, is a peculiar and distinct exertion of the mind; and that the knowledge it affords is clearly and substantially different from our sensitive ideas of matter. A stricter scrutiny will shew that these concessions are both unauthorised by facts.

By strict attention to an act of consciousness, we are able to perceive, that it is not a simple and original act, but a complicated conception of the mind composed of parts that are common and familiar to our thoughts. The essential constituents in its composition appear to be; the feelings at the time predominant; the ideas and perceptions of our persons and the objects immediately around us; and an attentive consideration of our feelings and persons, as things connected together in the formation of self, and contradistinguished from other objects. When I would be conscious of my existence, which is the simplest action of this kind; I attend to those personal feelings which are then most lively; and to the connected ideas and perceptions of my own person; tacitly contrasting these, with my ideas of other things and of nonentity itself. This is the intellectual process which constitutes my knowledge or consciousness of my own existence. When I would be conscious of any particular action of the mind, the process becomes still more complicated. In this case I not only attend to my associated personal feelings and ideas, as constituting self in opposition to other objects; but I regard also, the particular act as it transpires within me; or if past, repeat it with attention. The most complete act of consciousness then, is merely a complicated conception, in which there is nothing new, nothing peculiar, except the attention that we give to the connexion and particular relations of its different parts. It is no more than a peculiarly attentive performance or repetition of sentiments, perceptions, and ideas formerly experienced.

The perceptions and ideas which constitute our knowledge of the material world, are merely intellectual actions. In the act of acquiring intelligence of an external object, there is nothing communicated from it, and embraced by the mind, as a distinct existence. It only excites the mind to action: and the action thus excited, and subsequently repeated without the agency of the object, is itself the constituent matter of all our knowledge.

If we now compare the properties of matter as known by us through the agency of sense, with the attributes of mind as known through the medium of consciousness; we shall find that they are not in our knowledge substantially different, but really the same; differing only in unimportant circumstances. Our knowledge of each consists in perceptions, sentiments, and ideas, which possess one common nature. In fact, those very perceptions and ideas of my person and the objects around me, which compose my knowledge of the properties of matter; those very personal feelings which are produced within me by my physical structure, and the operations of physical agents upon me; and those very acts of thinking which are merely repetitions of former feelings and perceptions excited by material objects; are themselves, as shewn above, the essential constituents of my consciousness of existence, and of the intellectual actions I perform. My knowledge of the properties of matter—and my knowledge of the attributes of mind—being thus composed precisely of the same constituent parts or elements; and differing only in circumstances trivial and variable; by what rule of logic or induction can I infer, that those objects are substantially different? I must conclude that they are not—that they are radically the same.

It thus appears that consciousness cannot, in any case, afford the shadow of an argument against the organic theory of the mind: for if the common doctrine concerning it be true, we prove its declarations perfectly consistent with our theory; and if the exposition given in this article be true, we then demonstrate, that mind and matter are substantially the same.

X. THE prejudice, which is so readily embraced, and universally entertained, on this subject. seems to be an unavoidable consequence of our mental imperfections.

OUR understandings are so weak and limited, that we can acquire only a very inadequate knowledge of the efficient elements and energies of nature. So great is our deficiency in this respect, that we can arrive at no intelligence, or rational views, on the subject of causation. Experience here is our only guide. We never could affirm, that any one event might not be caused by any other, if observations on the course of nature, did not impress upon our minds the customary connexions of causes and effects. It is merely the association of ideas produced by the constant conjunction of particular events, which induces us to view them as connected by causation. Let this be now applied to explain the prejudice in question.

SUCH is the construction of a human being, that we cannot readily observe, or have direct experience, of that connexion which does exist between the action of the brain. and the mental act of thinking. The act of consciousness by which we recognize our thoughts, gives no intimation of their physical concomitants; and the perceptions of sense. by which we learn the properties of matter and the action of the brain-give no intimation of thought as known to us by consciousness. The act of thinking, and its physical cause, being thus discovered by us in different ways, do therefore not become associated in our minds, and thence must naturally be believed by us to be distinct and independent of each other, entirely unconnected by causation. On the contrary, if we had always by the same percipient action apprehended both our thoughts and the physical events on which they are dependent, they would now be so connected in our minds, that we could no more doubt the act of thinking to be a physical effect, than we can doubt the motion of the second billiard ball to be effected by the impulse of the first

XI. Convinced by the arguments I have thus advanced, that there is no immaterial principle in man which forms the basis of his mind, I shall proceed to investigate his nature as constituting a science purely physical.

By pursuing this course, I am not necessarily erecting a system on the opinion I have adopted concerning the nature of the mind. It is well understood at the present day, that a spiritualist can cultivate the most important part of metaphysics, consisting of the laws which regulate our mental transactions, without a reference to the ultimate constitution of intellect itself. The materialist can also investigate the physical principles and laws of human nature, without a reference to his own opinion of the mind to prove what he advances. On such a plan I purpose to proceed; endeavoring to construct a system by the inductive method, from materials furnished by an attentive observation.

It is an indisputable fact; that, for every intellectual action, there is a corresponding movement in the material part of our composition. No thought or sentiment ever transpires within the mind, which is not marked by a simultaneous action of the brain: and hence whatever fact or principle can be established in the spiritual scene, will prove, translated to the other, physically true. It appears to me satisfactorily proven, that the physical transactions are all that really exist: but those who differ with me here, believing that there is something more than shadowy forms and fancied beings behind the visible scene of realities, may continue to enjoy this belief without dissenting from me on any subordinate point, except the use of language. What I affirm concerning matter intellectually organized, will appear to them correct when expressed in the language of *their* theory.

According to the spiritual hypothesis, the science of metaphysics should be divided into two distinct parts—a physiological and a spiritual. The former should embrace the physical principles of our nature which correspond to the abstract properties of mind, or in any way affect the intellectual operations: the latter would then merely contain a portion of the same matter delivered in a different language—the present dialect of metaphysics. According to such a division, the present treatise would be entirely physiological; but in order to make it comprise the spiritual part also, it would only be necessary for the spiritualist to translate my language into the abstract dialect, in all those cases in which he thinks the spiritual substance acts in concert with operations in the common sensory. When such a translation is made, I trust he will find no proposition maintained, which will not literally accord with strict and ample induction.

CHAPTER II.

AN OUTLINE OF PHYSIOLOGY.

A LARGE proportion of the literary persons for whose amusement and instruction this work is intended, are not sufficiently acquainted with the structure of their systems, and the uses of their organs, to enable them to enter with facility into the subsequent speculations of this treatise. To remedy this disadvantage is the principal purpose of the present chapter; but I trust the information it contains, independently of the use to which it is thus applied, will not be uninteresting to those who are not familiar with the subject.

I SHALL endeavor to give, a succinct view of the final causes which nature seems to have contemplated in the construction of our systems; or a brief statement of the uses which the different parts of the human body are destined to subserve in the economy of life.

THE final object which nature appears to have in view, in the construction of every animal system, is the pleasurable existence and perpetuity of its vital state. To this purpose she renders every organ subservient: but the scenes and the physical agencies in the material world are so various, that her resources for accomplishing the same object are exceedingly diversified. There are a multiplicity of terrestrial situations in which animal life may flourish; and in each, a variety of modes by which it may be supported. Corresponding to this diversity of means, great variety is observable in the construction of animal beings, in which the same ultimate object, the pleasurable support of life, is constantly contemplated. But the same physical constitution of things, from which the resources of this diversity are derived, has also given them limits, and subjected the vital operations of nature on every theatre to numerous and great degrees of imperfection. The sphere to which she has confined the human species, and their modes of subsisting in it, are well known to us; and to develope the purposes to which their various organs are subservient in these circumstances, is the object of the present inquiry.

As the paramount final cause in every animal structure, is the pleasurable support of its vital state, the first object in the formation of a human being, is the establishment of an immediate receptacle for the principle of life. The effectuation of this purpose requires no particular mechanical conformation of parts. The suitability of any portion of matter for possessing the principle and performing the functions of vitality, depends on the elementary principles of which it is composed, and the intrinsic manner of their combination. The external form is nothing—the radical elements, and their mode of composition, are the important points. There is hence in the formation of animals in general, no particular organ exclusively imbued with vitality, and entrusted alone with the peculiar and immediate functions of life. On the contrary, the whole fabric constitutes the receptacle of life; and every subordinate part participates in the intellectual or sensitive transactions. In the human system, if we except the bones, hair, and nails, every organ we possess, by its susceptibility of excitement and sensation, becomes an immediate agent in the events of sentient life, to which it is at the same time indirectly tributary by performing functions peculiar to itself.

The brain however is the organ particularly consecrated to the grand purposes of intellectual life. In man it is the source and the instrument of every thing noble and interesting. If it were not physically impossible, for it to retain its vital state, and subserve the purposes of mentality without the aid of subsidiary parts, we should doubtless be formed of this organ alone, all the vast complication of members which now compose us being useless in attaining the primary object of our existence. But the laws of matter, and the circumstances of mankind, forbid this simplicity of structure, and render the employment of subordinate parts indispensible.

In the first place, it is necessary to the excitement of the brain, and its command of the parts subsidiary to its welfare, that it should have organs of communication with those parts, and with the rest of the physical world. For this purpose its substance is elongated into cords forming the nerves and spinal marrow. Some of these are distributed and ramified through all parts of the system, terminating by minute fibres in the smallest portions of the body, and serving as a medium of reciprocal communication between them and the brain. Others are terminated in peculiar structures, on the external surface, called the organs of sense, and serve the purposes of communicating with the external world. These organs of sense are the principal sources of mental excitement, and are so constructed and situated as to recieve with facility, the necessary impressions from the contiguous objects. The rest of our excitement, making up the sum total of life, originates in the performance of the functions necessary to our individual preservation and the perpetuity of our species.

The immediate agency of the brain in the events which constitute intellectual life, is thus radically dependent on the functions of the other parts of our bodies, and on its intercourse with external things. Its vitality too, or intrinsic structure, which enables it by these means to evolve the peculiar phenomena of life, depends on them also for its preservation. The various actions of material agents to which it is subjected, with the operations of excitement themselves, tend continually to disorganize, destroy, and dissipate its substance. It is only by means of the parts with which it is connected, that it can protect itself from destruction by foreign influences, and renovate its unavoidable waste by receiving and elaborating new matter. And the organs which accomplish these purposes for it, render at the same time, the like necessary services to themselves.

This protection of the brain and system in general, against the injuries with which they are constantly menaced by the common revolutions of nature; and the procurement of matter suitable for the repair of their inevitable waste; are effected principally by the instrumentality of the bones and muscles. A part of the skeleton is so constructed as to form a solid casement or firm shield for the brain and spinal marrow, by which they are protected from being injured by those daily unavoidable impressions, which, though sustainable by the rest of the system, are sufficient to destroy the tender medullary texture of these parts. The entire skeleton serves as a frame work to support and carry the soft parts, and to confine them to their proper relative situations. Its construction out of separate pieces, connected together by moveable joinings, adapts it to all the processes of locomotion and the manual arts, performed by the immediate agency of the muscles under the direction of the brain. The muscles themselves are applied to the skeleton in the most advantageous manner for effecting these purposes. By their actions in obedience to the dictates of the brain, the bony frame with all its load of organs, is moved with facility in every direction; whether necessary to avoid impending danger, or to procure the conveniencies of life. All tho mechanic and liberal arts, whether necessary or only ornamental, whether tending immediately to our preservation and sustenance, or to the production of pleasurable excitement, are performed by them, acting on the skeleton to which they are connected, under the superintendance of the brain through the medium of the nerves and senses.

These objects, then, the defence of our systems, and the subjection of the physical world by art to the purposes of our sustenance and excitement, are the final causes contemplated in the peculiar structures of our skeletons, and in the muscular powers applied to them.

With regard to our intrinsic preservation and repair, the performance of locomotion and the manual arts can effect nothing directly. They can only procure, prepare, and apply, the suitable materials. Other organs are necessary for their assimulation, and the immediate office of nutrition.

The first of these in the order in which they succeed each other in the process of assimulation, are the organs of mastication and deglutition. Their function is mechanical. They receive and triturate our food, mixing it with the saliva, and send it on to the stomach to pass through the second stage of the process. This stage consists in a peculiar species of chemical solution, by which all the various alimentary matters are approximated to a common state in which they are denominated chyme. They are then carried on through the intestines, receiving an admixture of bile and pancreatic juice, from the liver and pancreas, by which a portion of them is farther animalized, constituting the chyle which is absorbed by the lacteals. These assimilatory changes are strictly chemical, being effected by the agency of specific solvents. Two kinds of organs consequently are necessary to the performance of this function; glands for the preparation of the solvents, and receptacles in which the solutions may be made. The stomach is a hollow glandular organ adapted to both these purposes; its glandular structure enables it to secrete the gastric solvent, by the admixture of which with the aliments in its cavity, the first degree of assimilatory solution is performed. The additional agents by which this solution is completed, are prepared by distinct organs, the liver and pancreas, which secrete their respective liquors from the blood, and pour them into the receptacle formed by the upper end of the intestines, where they are mingled with the chyme received from the stomach. The chyle, which is the result of this admixture, is absorbed by the lacteals; and the remaining materials, being incapable of assimilation, are ultimately discharged from the system. The fresh formed chyle, it appears, is still too crude to be received into the blood vessels to be converted into blood, and is therefore subjected to a third degree of chemical change in the little glands of the mesentery through which the lacteals have their course. These lacteal glands probably perform their functions like the stomach, by secreting into their cavities, a liquid, which combines with the chyle, approximating its qualities more nearly to the animal state. It is then carried into the blood-vessels, and finally converted into blood in the extremeties of each circulation—in the lungs by their ærating function—and in the capillary arteries of the larger circulation by their glandular influence.

For the purpose of converting our crude aliments into a state suitable for our sustenance and repair, we are thus furnished with a complex series of parts; with organs of mastication, a stomach, liver, pancreas and intestines;

a variety of lacteals with their glands, and a sanguiferous system. The blood which it is their ultimate object to form, is a mixture of heterogeneous principles, adapted to the double purpose of nourishing the solids and repairing their waste, and of preserving their vital state. That it may answer these purposes, it must be preserved in a state of purity and perfection, and be constantly applied, in this state, to every part of the system. It accordingly receives a constant supply of fresh materials from the assimilating organs; and is contained in a system of vessels, which by their minute ramifications and distribution through all parts of the body, and their power of circulating their contained fluid, are enabled to apply it continually in a renovated state to every fibre in the whole system.

The organs of assimilation are subject in the performance of their functions to the blind unalterable laws of chemistry and mechanics. They consequently cannot produce the same result, a nutritious unadulterated blood, from the very different kinds of crude materials on which man is obliged to subsist. The blood would therefore become impure and unfit for its proper uses, if organs were not adapted to correct this defect in assimilation.

The various glands, whose general function is the secretion or separation of something from the blood, perform this corrective service, and answer likewise a variety of other important purposes. The lungs and the kidneys, by separating and discharging from the system a variety of useless and injurious matters which collect in the blood, prevent its deterioration, and become supplemental to the organs by which it was formed. Other glands, by the secreting process, form peculiar fluids from the elements of the blood, which are not exerementitious, but highly useful in the economy of the system. Such are the solvents used in the various stages of assimilation; the fluids by which the species are propagated, and nourished in infancy; and the various liquids employed for the lubrication of surfaces, the moistening of membranes &c.

The defence and preservation of the system is finally completed by an investment of skin, which encloses the whole body.

But such are the imperfections, or the wise principles of material nature, that no material machine or system of organs can be formed, which will sustain the action of the elements without destruction. Matter is universally imbued with active qualities which keep it in perpetual change and commotion: and animal bodies are subject with the rest of nature to the universal law of instability. All the powers of sustenance and repair which the human system can exercise by its organs of assimilation, aided by consummate prudence in the arts and general conduct of life, are unable to avert the infirmities of age and final dissolution. For the perpetuity of human kind, it is consequently necessary, that we should possess the powers of reproduction; and we are accordingly furnished with organs competent to accomplish this purpose.

Thus the complex fabric of man is completed in subserviency to the final object of his pleasurable existence and perpetuity. He is furnished with a brain—susceptible of receiving, enjoying, and exercising, every elegant and noble attribute of intellectual life—and connected with organs subservient to this purpose, and to its physical necessities. It is lodged in a bony frame by which it is mechanically supported and protected. It is connected by nerves with the organs of sense, through which it is enabled to converse with the external world, to practice the fine arts, and to exercise the general functions of mind: by other nerves it communicates with the various muscles and other organs, which obey it in the practice of the useful mechanic arts, and in the various functions of digestion, circulation, secretion, by which its immediate sustenance and perpetuity are effected.

I MAY add another concluding remark. It appears from this inquiry into the reasons of our peculiar structures, that the internal economy of nutrition and procreation, with the practice of the arts which are subservient to them, is not the primary object of life, but imposed on us by the necessity of our situation and material nature. To secure our attention to them it was consequently necessary, that their performance should be incorporated with our pleasures and mental exercises. We are accordingly impelled, to the protection of our persons, the pursuit of wealth, the taking of aliment, and the procreation of the species, by urgent appetites, strong intellectual passions, and various pleasurable exercises of the mind. Individuals however occasionally rebel against these dictates of nature: the enthusiasm of poetry, philosophy, and religion, disdains them, and aspires exclusively to the lofty, congenial, and primary pursuits of an intellectual being.

CHAPTER III.

OF THE NATURE AND PRESERVATION OF ANIMAL LIFE.

HAVING considered the various ends, which our organs are destined to promote in the animal economy; we will now direct our attention to the superior attribute of life, whose pleasurable preservation is the primary object of all the organs, the functions, and resources of the whole system.

I AM not unapprehensive, that the discussions into which this subject will lead me, may be deemed incompatible with the character of a metaphysical treatise. But I would presume, that those who think, with me, that intellect itself is only the most perfect kind of animal life, will view the contents of this chapter as perfectly consonant with the character of the work; and that they who think differently, will not be dissatisfied with the information it contains.

ANIMAL life has commonly been considered as an extraordinary and supernatural principle, or as something very peculiar, and foreign from the general properties of material nature. Unaided by experimental philosophy, the knowledge we can acquire concerning the varieties and powers of matter, is very indefinite and circumscribed. To our incurious unpracticed observation, matter appears to be a passive substance, scarcely possessed of more than mechanical properties. The principle of life is so strikingly different from these, that we are naturally induced to search farther for its origin. But when the mind returns from the fruitless search, and examines the crude elements of our frame with the spirit and patience of an experimentalist, it is enabled to identify them with the common elements of the mineral and vegetable kingdoms, and to discover in them such various energies and resources, that it can no longer doubt of the material origin of life. Since the rational spirit of experimental enquiry has been so extensively cultivated by the moderns, and has enabled them to make such great progress in the new chemical philosophy, it seems to be agreed very generally, that matter alone is capable of displaying all the phenomena of animal life.

A FEW general remarks will explain and demonstrate this truth to the satisfaction of every capacity.

THE essential qualities of matter, are indestructible. We learn from the extensive researches of the chemical philosophy, that not an atom can perish. or be radically changed in its constituent properties. The forms only in which it is exhibited to our senses can be subverted or modified. Our unassisted observation cannot trace the elements of matter in their innumerable combinations, or even ascertain the continuation of their existence; we might hence from their evanescence or new aspect, conjecture their destruction or change; but the minute and accurate research of the experimentalist, is still able to develope them unchanged from their latent or novel condition.

By the operations of chemistry they are obtained in their simplest forms or combinations: in the mineral kingdom nature displays them in forms more complex and various, though simpler than in any other natural state: in the vegetable kingdom they ascend to such singular and intricate degrees of complexity, that they exhibit appearances, which, without the aid of philosophy, would be deemed above the powers of matter: entering into the formation of animal substances, they attain their utmost degrees of complication, and produce those forms of which the principal attribute has been thought supernatural. In all these varied conditions their essential properties remain unaltered. In passing from the mineral to the vegetable, and thence to the animal state, they suffer no accession, diminution, or change of their qualities and powers, The novel and dissimilar appearances they exhibit are merely formal, or dependent on the number of the elementary principles, and their mode of combination. Nor is this merely inferred from an assumed indestructibility of the essential properties of matter; it is demonstrated by chemical analysis. We may then conclude, that vegetation and animal life, are nothing more, with all their extraordinary properties, than the results of peculiar combinations of the common elements of matter; since it is proven, that a difference in the elementary constitution of substances, will produce in them the most singular and diversified appearances.

When the necessary elements are combined together in that mode, which constitutes the basis of animal life; the body which they form is said to be organized. In this work I shall therefore use the term organization, or the phrases, organic, and vital structure. to signify the vitalised state of matter, or the radical source of animal life.

This organic structure, which is itself the principle of vitality, is not an unit in nature, or a specific and invariable combination of the same elements : on the contrary it admits of great diversity in its character. The intrinsic composition of the corresponding solid parts of different kinds of animals, is probably as various as their external forms. The organization of a man, and of an ox, cannot be supposed precisely the same in any of their organs. The use of hands, or the mechanical advantages of his form, could not alone give to the former that superiority which he possesses. And in the different organs of the same animal, there is still a greater dissimilarity of intrinsic structure. The organic difference between a membrane and a bone, between the parenchyma of the brain and the fibres of a muscle, is obvious alike to the dissector, the chemist, and the physiologist. In anatomy these parts display different physical properties; their chemical analysis developes dissimilar elements; and their functions in the animal economy, are very unlike to each other both in purpose and manner of execution. They consequently cannot possess the same organizaton. But they have at the same time some common properties in their structures, which constitute the essential conditions of life, and connect them together in the same class of natural substances. They all agree in the possession of certain proximate qualities, as sensibility and motion, which are characteristic of life; and in conjunction with the systems to which they belong, they alike pass through the stages of growth, sustenance, and decay

But what the ultimate conditions of animality may be; and what latitude of modification they can admit, have not yet been discovered by the deepest researches of philosophy. We can only affirm that the elements of matter can be so combined, in various modes, as to display the properties of animal life.

The human system is thus a machine entirely material, composed of a great variety of elementary particles, possessing various effective energies incessantly exerted. These energies, in the language of chemistry, are called attractions or affinities. By their various counteracting and co-operating exertions on each other, they combine the variant elements possessing them into those neutral masses, which seem to have mechanical properties only; and also into those organic substances, which, under the influence of other physical agents, display the attributes of life. The balance of these affinities, or the preponderance of the attractions, by which the organic state is maintained, does not commonly prevail to any great excess: and a great variety of active materials, coalescing together in a state of equal operation, are not calculated to produce a durable substance. Ternary and quaternary compounds in general are easily decomposed. A slight predominance of any discordant affinity in the organized substance, or the moderate action of an external principle upon it, quickly deranges the whole fabric.

When two elements, as oxygen and sulphur, are combined by a powerful attraction, so as to resemble in some degree a simple substance, they are capable of a strong combination with another substance similarly composed, as soda, and of thus forming a quaternary compound, which shall possess a great degree of durability. But when three or four elements, as oxygen, carbon, azote and hydrogen, enter primarily, as equal agents, into the formation of any substance, the complicated counteraction of powers, or the nice balancing of attractions, which necessarily takes place, may easily be deranged, and the elements hastened to the more natural state of binary compounds. Such is the condition of animalised matter in general. Its elements cannot compose a more delicate and complex structure, than that denominated organic, whether we consider it with regard to the number of elements employed, the nice subtilty of their composition, or the facility of their derangement.

Although the vital structure may receive, from the hand of nature, an infinite variety of modifications ; yet when it is completed in a given case, and has received its specific character, the least deviation from its constituent conditions, precipitates it below the grade of vitality. Death has already supervened from the slightest cause, before any change of structure can be discovered by anatomical inspection or chemical analysis. There is consequently much vigilance and labor required, to preserve our organization from the rude shocks of physical agents, which are sufficient to dissolve it and restore us to our primitive dust; the sphere in which we are destined to exist, necessarily exposing us to the action of various physical principles.

We have already considered the organs of the human system, as subservient to its protection against the deleterious activity of these agents; and to the repair of the inevitable injury they inflict. It is necessary to be more particular, and to consider their constant and regular operation upon us, as being itself preservative to the vitality of the system.

Physical agents cannot possibly co-exist with regard to time and place without exerting their energies on each other. No substance, vital or inanimate, can continue on the surface of this globe unaffected by the atmospheric elements, the water, the caloric, and the electricity in which it is immersed. If its structure be not extremely durable, it will be modified by their influence upon it: and every important modification of character which it may receive from them, will depend for its continuance on the continuation of their agency which produced it. The human body, living on the surface of the earth in the midst of various physical powers, becomes therefore dependent on them alike for its preservation and destruction, its life and death. Its organization is necessarily adapted to the exertion of their energies upon it: and being possessed of similar properties, whence a reciprocity of action is maintained, it must necessarily be unable to survive their loss. Hence the majority of these agents do not derive their character of preservative influences, from any inherent necessity of animal life; but merely from the necessity of its being exposed to their action. I will proceed to notice succinctly their nature and mode of operation on the human system.

The element of heat is one of the most obvious and efficient principles, which operate on our vital structure. It is proved by the new chemical philosophy, that it is at least so far material as to be able to enter into chemical combination with the elements of matter; and that in this way it makes an essential ingredient in the composition of every natural substance. It is of course an element of our organized bodies; but it is not in this character that we now consider it. A great quantity of it, in a sensible or uncombined state, pervades the whole terrestrial system of things; and consequently envelopes and penetrates every portion of our bodies, exerting a powerful action on their vital structure. It is the most powerful and universal chemical agent in nature; and as such must strongly affect so nice a chemical fabric, as that which is the basis of vitality. Its presence in a certain quantity is essentially necessary to the perpetuity of this fabric, as we see demonstrated in mortal characters, by every considerable deviation from the vital temperature in the human body. It exerts a powerful modifying influence on the attractions by which the organic state is principally produced and supported; and therefore its increase or diminution must produce a corresponding alteration in that state.

As in other matters, so with respect to the presence of sensible caloric, organization is susceptible of much variety; different kinds of animals requiring the presence of very different quantities in their bodies: whence arises the division of the animal kingdom into the warm, and the cold-blooded classes. The latter, living principally in the water, and under the surface of the earth, have the proper temperatures maintained in them, by the objects with which they are in contact; whilst the former class, in which man is numbered, residing in the atmosphere whose temperature is extremely fluctuating, necessarily require the aid of other means to support their vital heat. They accordingly possess the power of generating heat within their own bodies, so as always to preserve nearly the same temperature: and man, whose structure is the most delicate, assists this internal function by the mechanic arts—by the use of clothing, architecture, and fire. He thus protects himself particularly against the invasion of cold, or the diminution of his temperature. His means of resisting an excess of heat are equally effectual. The atmosphere, possessing a temperature lower than the vital in him, is continually cooling his person, in which office it is aided by a constant evaporation from his surface. The internal production of heat itself is also lessened by any increase of his tempe.rature: hence an injurious excess of caloric cannot possibly occur in the ordinary course of nature.

A PRINCIPLE, similar in some of its properties to the former, is electricity. Philosophers have indulged themselves in conjectures respecting its connexion with animal life. Some have supposed, that under some modification it constituted the principle of vitality itself. With respect to organization, however, I believe it is nearly neutral; for neither its accumulation nor abstraction has any obvious effect on our bodies. In its quiescent state, its influence on the organic structure must consequently be very inconsiderable. Its chemical agencies, and its effects in animal electricity, and in the electric shock, demonstrate its action on vital and inanimate matter, when properly managed, or in motion to restore its equilibrium; but they do not prove its agency as a preservative influence on organization.

The proper elements of the atmosphere in which we live and breathe, in conjunction with the matters which it usually suspends, exert an influence on the principles of human life: for it is certain that its changes affect the health of the human system. But its principal influence is exerted through the medium of the blood, and of its mechanical pressure on the surface of our bodies. Its pressure is preservative to life in various ways. It counteracts the force of the heart in the circulation of the blood. The animal economy requires, that this fluid should be circulated with a velocity and force, which the coats of the arteries, unbraced by atmospheric pressure, would be unable to sustain. The arteries in the lungs, being the most unprotected by other parts, are the first to yield when deprived of this support. Hence persons, who ascend into the light air on the summit of a high mountain, are liable to suffer an hemorrhage from the lungs. Or if the pressure of the air be removed from any part of the skin, similar effects ensue—suffusion of blood, inflamation, and hemorrhage. But this operation of atmospherical pressure, is mechanical and indirect. It is also immediately preservative to the vital structure. Its obvious effects on chemical experiments, demonstrate its power to modify the operation of the affinities on which organization depends. We are astonished to learn from the science of hydrostatics, that the surface of the body, external and pulmonary, sustains an atmospherical pressure, equal at least to 50,000 pounds. Could we survive its removal? On the contrary its increase would be equally injurious; for a slight additional pressure on the brain, produces insensibility, and presently death itself. The human body is, literally, in a press: straiten it and we are crushed; relax it and we explode.

Another source of mechanical influence, which is necessary to our existence, is the gravitation of our bodies towards the centre of the earth. We are composed of matter, which must incessantly gravitate; our vital texture must consequently be adapted to sustain its gravitation: but this cannot be effected without incorporating them together—without making gravity essential to our existence. Accordingly its increase or diminution to any considerable extent, is fatal. To illustrate this subject, we may compare the action of gravity on our bodies, to the action of a current on a sponge through which it passes. As long as the sponge is held stationary, it must sustain or resist the impulse of the water gliding through it: but as soon as it is liberated, it receives the motion of the current, and glides down without suffering any further impressions. So while the human body is supported in the current of gravitation, it must sustain its action; but as soon as permitted to fall, it moves with the impelling force, and thence receives less of its influence. During this suspension of the gravitating influence as we fall, the most horrid sensations are experienced. They are independent on the terror of this situation; for they are felt equally severe when we fall in perfect safety, as in swinging rapidly on a short swing: and they are also evidently felt by infants who can have no apprehension of danger. They prove the influence of gravity on the principle of life, and authorise us to infer, that the human body in falling from a great height, would become exanimate before it reached the surface of the earth.

THE excess of the same principle would perhaps be more injurious than its deficiency. It might be increased, till it would counterbalance the cohesion of our elements, and reduce us to the state of fluidity. If the planet Jupiter be composed of matter like this earth, with an atmosphere surrounding him, man could not exist on his surface. His attraction, more than 14,000 times as great as that which we experience, with an atmospheric pressure equally increased, would be sufficient to disorganize our systems in an instant. Perhaps iron itself under the influence of his attraction would become fluid. Thus the principle of gravitation, like the principle of heat, in a due degree, preserves our vitality; in a less degree it would suffer us to perish, as with cold; and in excess, it would, as certainly as the fiery furnace itself, disorganize and dissipate our substance.

Light is a principle which has some degree of influence on organization. Its agency is essential to the perfection of vegetables. When reared in the dark, their color is pale, their substance tender, and their internal properties entirely alienated from the peculiarities of their species. A similarity of difference occurs between the cloistered female, whose transparent skin is never penetrated by a sunbeam; and the laborious husbandman, who is daily exposed to the meridian rays.

The principles we have now discussed are strictly external to the system; and as such may be distinguished from those matters contained within it, which are universally known and acknowledged to possess a preservative power. The first of these are the aliments we eat; which exert a conservating influence, essential to the continuance of organic life, independent of the nutrition they afford. In the act of starving, death supervenes before the blood has become so deficient in quantity, or unwholesome in its composition, as to induce this catastrophe; which must therefore be caused by the privation of a beneficent influence, exerted by our food, in a direct manner, on the stomach and the other parts with which it comes in contact. This direct conservative influence, like that exerted by heat, or by gravitation, appears to derive its character in this respect from the incidental necessity of its presence in the stomach. The preparation of a nutritious blood can only be effected by a digestive process, in which extrinsic matters must be brought into intimate contact with our systems, and exert an influence upon them; which they of course must be adapted to receive as beneficent.

PASSING from the stomach into the blood vessels, we there find the most important and genuine preservative materials. The elements of matter, as formerly observed, are incapable of being combined into an organic system, that shall possess, within itself, the power of independent and perpetual existence in this terrestrial scene. The vital structure must be provided with a stay to its deterioration, and a nutriment to repair its unavoidable injuries and comminution. The blood alone is the proper principle, prepared, and consigned, by nature to this particular use. The other physical principles of caloric, gravity, aliments, derive their preservative functions from the necessity of their coexistence with our vital substance; whilst the blood is an artificial means, elaborated and applied with the most toilsome assiduity. It derives some of its most important properties from the action of the air upon it in the lungs, from which place it is distributed to the minutest portions of the system, exerting its nutrient and preservative powers. Its utility in the preservation of life is demonstrated, by the instant death which generally ensues its stagnation, or its adulterated state produced by the want of respiration; and by the debility and death which are caused by its loss. Its principal ingredients are very similar in their nature to the solid muscles and membranes. They are composed of the same elements, combined so nearly in the same way, that they exhibit many similar facts in physiology as well as in chemistry. The blood has hence been thought completely vital; and it is indeed so far organic, that a perfect reciprocity of influence exists between its ingredients and the solids which embrace them.

THE process of nutrition, comprising the growth, sustenance, and repair of an animal substance, is very imperfectly understood; yet it is probably a very simple and purely chemical event. The blood, elaborated by the digestive and respiratory organs into a state nearly vital, is brought into contact, or mixture, with all our solids, in which situation its different proximate principles combine, by chemical affinity, with the fibres of similar composition. In infancy our recently formed solids are soft and tender, retaining very much the nature of the fluid ingredients from which they were derived; whence their combination with those ingredients is rapid, constituting the process of growth. As they become more firm and rigid through age, this combination is proportionally retarded; at twenty they cease to grow; at forty, to be nourished; and at sixty they have attained such rigidity and decay, that their preservation too must cease.

LIFE has been rightly considered, by some modern authors, as proceeding from the action of external agents on an organized body. But the manner of their operation has not been completely understood and explained; for they have been considered as stimulants only; and an excessive proportion of one has been supposed to counterbalance the deficiency of another. The doctrine of animal life, and the radical manner of its dependence on these agents, which has now been delivered, appears more satisfactory; and teaches us, that an application of all these agents in a regular manner and due degree, is indispensible to the preservation of life. Nor can any thing be more conformable to fact: for we might as well attempt, in combustion, to supply the place of air by an excess of fuel, as to supersede, in the preservation of life, the necessity of caloric or gravity, by an excess of food. It is only partially true, that one stimulus can supply the place of another; for there is always some degree of specificacy in the action of every physical power.

CHAPTER IV.

OF EXCITABILITY, EXCITEMENT, AND RENOVATION.

The object of language is the conveyance of our ideas. In the infancy of mankind, their ideas were few, and their reflections crude; their language of course had a corresponding barrenness and inelegance. As civilization advanced, observations were multiplied, reflections were rendered more acute and comprehensive; and the defects of language were remedied by the invention of new words, the correction of phraseology, and the improvement of diction. In this way, the learned and the modern languages of Europe, have been reared into those ingenious and magnificent fabrics, which constitute the greatest monuments of human genius; and the depositories of the arts, the science, and the intellect of mankind. But human knowledge is still progressive; every day adds something to the original fund, and demands improvement in the means of communication.

Two methods are pursued in effecting this improvement, which are both attended with disadvantages: one consists in associating our new ideas with words already in existence; and the other, in the invention of terms for their particular use. The former tends to confuse and perplex our thoughts by the multiplicity of meanings, and shades of meaning attached to the same word; whilst the latter is very burthensome to the memory. They have both been abused, having been often unnecessarily employed. Every fanciful and frivolous innovator in science, comes forward with an apparatus of new terms, and phrases, and definitions. But those only which are fraught with correct, original, and important information, obtain currency among mankind, and are transmitted to posterity.

Having advanced some pretensions to originality, it may naturally be expected, that I will write a new technical language. In this respect however, I shall be as restricted as possible; inventing no new terms whatever, nor using any phrases which are not naturally suggested by the speculations I pursue. With respect to my technical language in general, the principal thing to which I would solicit the attention of my reader, is precision. I shall endeavor to use my terms according to their primitive and most literal acceptation; and I would request my reader, to free them in his mind, from that vague and discordant jumble of meanings, and semblances of meaning, which they have collected in their passage through the works of so many physical, metaphysical, and moral writers. In conformity with these views, I have already employed the terms organization and preservation as technical in this treatise. In its most literal sense, organization means the adjustment of parts to each other, so as to form a regular system: and according to this meaning, it has long been used in science to signify, that composition of elements which occurs in an animal substance. I have only endeavored to prove, that this peculiar composition is the radical source of animal life, and that it cannot be maintained without the presence, and action upon it, of certain physical agents, which, from this circumstance, I have denominated preservative influences. Excitability, excitement, and renovation, are the terms I shall use, with an equal regard to their primitive meanings, to signify the topics to be discussed in this chapter.

ALL the writers on animal life in the present age, theoretical and practical, in whose works the term excitability is found, have appropriated it to signify, that property of organized matter, or that principle inherent in a living animal, which is the source of all its spontaneous or proper motions: and in this sense I shall continue to use it in the present treatise. That such a principle does really exist in every living substance, is not less certain, than that effects must have their causes.

IN the human mind, the ideas of cause and effect are so indissolubly associated, that the occurrence of any extraordinary event, irresistably leads the most incurious person to enquire for its cause. On the inquisitive mind of the philosopher, the most customary occurrence has an equally coercive influence. The familiar appearance of motion in an animal body, excites his curiosity, and he enquires from what source it is derived. By a series of attentive and considerate observations, he is able to ascertain, that all animal motions proceed either directly or indirectly, from the action of certain physical agents on the living system in which they occur: and as the action of the same principles on any other substance, does not produce the same effects; he infers, that *they* are not the only causes; but that there must be some peculiar property in vital matter itself, in consequence of which their agency produces these effects. The common sense of intelligent men, considering this property in a practical manner, or with regard to its effects alone, seems to have decisively determined, that excitability is the term by which it may most clearly be expressed. The fanciful speculations, or the real discoveries, of theoretical men, concerning its intrinsic nature, have induced them to adopt other terms, and modes of expression, more significant of their own conceptions; such as animal spirits, nervous fluid, sensorial power, irritability, contractility, vital principle. But until these speculations are established by general consent, and incorporated into the common fund of correct philosophy, the terms adapted to express them, should not be preferred to those suggested by the facts themselves as apprehended by the common sense of mankind.

I SHALL also use two other terms, irritability, and sensibility, to express, according to their common meaning, different modifications of the vital principle. In practical medicine, in morality, and in common life itself, irritability signifies an unusual or morbid facility of receiving impressions; and sensibility expresses the power of sensation; which are both particular modifications of excitability.

ANIMAL life has been ascertained to consist in that peculiar combination of the common elements of matter, which is termed organic. In organization we are consequently to search for the cause, or the radical source, of all the facts and events peculiar to this department of nature. Excitability is the most important, and fundamenntal principle it embraces—a principle on which the most obvious transactions of human life are all dependent. That it is merely a condition of the organic structure of the fibre in which it is found, it may be difficult to demonstrate; but it is extremely probable. I would define it to be, a property of organisation, variable, and unessential to the continuance of the organic state. For example, I would say, that the excitable state of a muscle, or its condition before it contracts, consists in a certain mode of combination in its elements; when it has acted until it is no longer excitable, and relaxation ensues, that original mode of combination is changed into another fundamentally the same, but different in some subordinate conditions. The muscular fibre, by this change in its structure is not materially, or injuriously disorganized; but only rendered incapable of contracting any longer. What it loses in the process of contraction; or the difference between the excitable and the relaxed state; or the organic property which the excitable state possesses above the other; constitutes its excitability—Again; the retina, previous to beholding the color green, possesses a certain definite organization: by viewing that color till the eye can no longer distinguish it, this original definite state is changed into another, differing from it by an inability to have the perception of green; and the organic property thus destroyed or subverted, constitutes a part of the excitability in the retina. It thus appears to me, that the power of motion in the living fibre, which we call excitability, is not a distinct principle but a condition or property of its organic structure, which is deranged and subverted by the act of stimulation, without any fundamental injury to the vitality of the part. This view of its nature will authorise me, on proper occasions, to employ certain phrases which more clearly express my ideas concerning it. As it is an organic property, it may for distinction be denominated the excitable structure; and those conditions, more essential to vitality, which remain after its removal, may be termed, the fundamental structure. The organization of every fibre, may thus be viewed as capable of two distinguishable states, or degrees of perfection, the fundamental and the excitable; of which, the latter is merely a modification of the former.

That precisely the same elementary particles of matter, can thus combine together in different modes, which are readily convertible into each other, might appear problematical to the nice reasoner, if it were not supported by strong analogies. It is a fact, that some plants which are salutary, and others which are poisonous, possess very nearly the same elements; their very different qualities must therefore proceed from the different modes in which the same elements combine together. A case which affords a more direct and conclusive analogy is the coagulation of fibrin and albumen. By this process, these proximate principles of the blood are greatly changed in all their properties, sensible, mechanical, and chemical; yet they retain precisely the same elements, with the exception of a small portion of caloric which is discharged: and this process too, by which the combination of their elements is thus materially changed, is so precisely analogous, in many circumstances, to muscular contraction, that from it the ingenious Mr. Hunter has inferred the vitality of the blood.

BUT if excitability be not a property, or an immediate result of organisation, I must be allowed to demand the more plausible solution. The opinion that it is an immaterial something, an occult and self-existent quality, "is more properly a subject of derision than argument." The doctrine of a nervous fluid, or subtile matter secreted in the brain, and diffused through the whole system, being more plausible and popular, may deserve a refutation. It is singular how ingenious the human mind has proved, in the invention of subtilties to hide its own ignorance and imbecility—even from itself by the confusion in which they entangle it. The supposition of a nervous fluid only renders our notions on this subject more complicated and obscure. Instead of removing one, it creates many new difficulties. It is still necessary that the fibre should be organized, to enable it to receive the sensorial ether; and when this noble matter is present, it is then necessary that the action of a stimulus should be able to put it in motion, that it may act on the fibre and excite the motion required: and thus the effect is produced by a process of double stimulation, in which the external stimulus excites the nervous fluid to stimulate the fibre whose motion is the end to be accomplished. Passing over an endless train of subordinate inconsistencies, here are two difficulties, each of which is greater than the one they are introduced to remove. It is much easier to conceive, how a stimulus may act on a fibre, so as to cause its contraction, than to conceive how its influence shall produce motion in a fluid, or again to understand how that motion shall excite the contraction of the fibre. Nor does the supposition, which involves these difficulties, comport any better with facts, than the more simple doctrine of an organic property. It is however unnecessary to dilate on this topic; for absolute certainty is unattainable in the present state of our knowledge; nor is it important that we should approximate to it. The fact is well established, that there exists in vitalised matter, a power of being excited into action; and so long as we agree in the existence of this power, and the laws which regulate its activity, it is unimportant what difference of opinion may exist, with regard to its radical nature.

Certain physical agents, when applied to an excitable fibre, produce in its organization a specific process of change, or a peculiar derangement in the combination of its elements; and this process terminates in the partial or entire subversion of its excitable structure. The external agent exerting this influence is called a stimulus; and the process of change which it causes in the excitable structure of the fibre, or the disorganization of its excitability, is denominated excitement, and is attended by appearances, either obvious to our senses, or apprehended by the mind, which constitute the phenomina of life. These appearances, or sensible properties of excitement, have been elegantly and comprehensively defined by Dr. Rush, to consist in motion, sensation, and thought. The whole event, consisting in the application of the stimulus to the vital fibre, so as to disorganise its excitability in the manner of excitement, is expressed by the term stimulation.

THIS view of excitement is a necessary consequence of the doctrine just delivered, concerning excitability. If that attribute of living matter, consist in some property or condition of its organic structure, the muscular contraction essentially dependent on it, and eventuating in its destruction, must necessarily be founded in a disorganising process excited in that structure. The contrary is inconceivable. It would be as rational and conceivable to affirm, that the analagous coagulation of fibrin, by which the primitive mode of combination in its elements is changed into another very different, does not consist in a process of chemical change, or of decomposition with regard to the original fluid state.

THIS theory may also be demonstrated by an argument, which is independent of the organic doctrine of excitability. The only sensible property of excitement, is some kind of motion in the organic substance excited: but in every kind of motion, there is a change produced in the figure, or in the relative situation of the objects moved, a new arrangement among them being effected; consequently in the contraction of a muscular fibre, the intestine motion, which evidently takes place in its substance, must eventuate in a new arrangement of its elementary particles; and this is in substance the doctrine for which we contend.

THE ingenious but fanciful Darwin supposes, that in the case of sensual excitement, it is the new arrangement, or combination of elements, in the organ, produced by stimulation, which constitutes the idea: but that it is the process of alteration itself, and not the eventual state, which in this and in every other case, constitutes excitement, is evident from the progress and termination of this event. Excitement cannot be sustained without intermission, nor without an effort, or exertion, of which we are commonly sensible. Any state of combination in matter, which has continued for a second of time, might continue for ever, if no foreign agent should influence and subvert it; but neither a muscular contraction, a sensation, nor an idea, can continue any considerable time without intermission; nor be repeated until the conditions necessary to its performance are renewed in the fibre. It must consequently consist in a disorganising process, produced by stimulation, in the excitable structure.

I HAVE spoken of a stimulus as being a physical principle, which produces excitement when applied to an excitable fibre. It may be more scientifically defined to be, a change in the influence exerted on the vital substance by external agents. We have seen, that the organic structure of the human system, is incapable of an independent existence, The active principles, within whose sphere of activity it is destined to reside, exert a modefying influence upon it; whence they become essential to its perpetuity, and are denominated preservative powers. Every considerable change in the influence they exert, produces a corresponding change in the organisation on which that influence is exerted. Moderate degrees of variation affect only the exeitable structure, producing that process of change which constitutes excitement. Greater variations affect also the fundamental structure, producing disease and ultimately death. If a principle whose activity is not constantly exerted on the system, be brought to act upon it, the effects are commonly the same. A small degree of the additional influence will cause excitement, whilst a greater will produce a fundamental derangement of structure. But in the action of every principle on the system, whether constant or incidental, there is something peculiar and specific; so that its effects on the excitable and fundamental structures do not correspond with accuracy to the degrees of its variation. One agent is peculiarly adapted to affect the excitable structure in a particular way, whilst another acts more specifically on the fundamental. Comprising, however, all the agencies exerted on our systems, in one view, under the denomination of external influence, a stimulus may be correctly defined, a variation in the quantity or quality of that influence. A variation of temperature, which always produces excitement, is simply an increase or diminution of quantity. The application of mechanical violence, or of spirituous liquors to the surface of the body, is a change in the quality of the influence as well as in its quantity.

It perhaps rarely occurs in the common course of human conduct, that any kind of excitement is produced with such energy, or continued so long, as entirely to disorganise any portion of the excitable structure; nor is it probable, that a degree of stimulation so great, would not produce some material injury to the fundamental structure of the part to which it might happen. On the contrary, only a moderate subversion of excitability is produced, in performing the ordinary actions of life; nor does that subversion extend to the essential conditions of vitality: it is also capable of being speedily renovated, or restored to its primitive state of perfection The means by which this renovation of excitability is effected, are various, consisting of all the preservative agents discussed in the preceeding chapter: but oxygenised blood, and sympathy, are the principles pre-eminently efficient. When the muscles of the arm are exerted forcibly for some time, in grasping some substance with the hand, their excitability becomes exhausted, and we experience such fatigue, that the exertion cannot be continued: during a short period of rest, these renovating principles restore the excitable structure, and the action can again be renewed. So when the retina is exposed for some time to its proper stimulus, a bright light, it acts at first with vigor, but presently becomes so exhausted, that we see very dimly: a short period of seclusion, or darkness, then becomes necessary, during which its excitability is revived, and we are enabled again to see distinctly. For the renovation thus experienced after every occurrence of excitement, we are principally indebted to the renovating powers of oxygen and sympathy.

THE former of these principles we derive from the atmosphere by respiration. As the blood circulates through the lungs, it is exposed to the action of the air we breathe, from which it is separated only by thin moist membranes. Through these it attracts both the elements of the atmosphere, but principally the vital part or oxygen, which combines with some of its proximate principles, and is thence carried by them into contact with every fibre in the system.

OXYGEN thus combined with the blood, is the chief principle in renovation. It is the essential nutriment of excitability, and the radical supporter of the whole excitable structure. Sympathy is chiefly useful in extending the fabric, and repairing the injuries of its subordinate parts. For instance, when the excitability of any muscle, or organ of sense, is exhausted by stimulation, it is sympathy with the excitable structure of the whole system, which so speedily restores it to its primitive perfection; whilst that structure in its whole extent is radically dependent on the application of oxygen.

BY the term sympathy we mean to express a general fact, or law of organic structure. When a peculiar modification of that structure, is produced by powerful means in any particular part, it naturally extends to others, and frequently to the whole system: or the organic condition which prevails with greatest efficacy, whether in consequence of the extent which it occupies, or the force of the cause producing it, possesses the power of diffusing itself into the parts still unaffected, or differently modified: and this diffusion of the predominating property is termed sympathy. When the excitable structure of a subordinate part is reduced, the perfect condition of that structure, predominating in in the rest of the system, quickly extends to the suffering part, and restores it to the same perfection.

The nervous system, which is the great emporium of excitability, is at once the principal source of sympathy, and the medium through which it is constantly exerted. The importance of sympathetic agency, and of this medium for its communication, are demonstrated by the operation of cutting or tying a nerve; in consequence of which, the part supplied by that nerve has its excitement impaired, and presently becomes altogether paralytic. When a nerve, which is distributed to a muscle whose action is voluntary, has been cut or tied, the motions of that muscle must cease, because it can no longer be influenced by an act of volition; but it will continue for some time excitable by the direct stimulus of an electric shock. When the nerve supplying an involuntary muscle, as the heart, is destroyed, that muscle will continue to act for a short time, and then become altogether motionless. These facts demonstrate, that when any part is deprived of its sympathy with the rest of the system, or of some peculiar influence received through the nerves, it becomes incapable of any more excitement than is sufficient to exhaust the excitability it may then possess; unless the direct agency of oxygen should effect a partial renovation, to which in most cases it is probably competent. When an obstruction to the sympathetic influence is removed, as by unbinding the ligature on a nerve, the excitability is presently renovated, and the part resumes its actions. Thus when when we compress one of the crural nerves by sitting on it, we presently lose the power of moving the limb to which it belongs; when the compression is removed, that power is speedily restored by sympathy, and we proceed to walk as usual.

When the renovation of excitability is considerable and rapid, it produces a particular process of excitement, which consists in peculiar sensations of numbness and twinging; as every person has experienced in the above example of compressing the crural nerve, and also in other cases to be noticed hereafter.

By the influence of sympathy, the excitability of subordinate parts may be supported, and its exhaustion repaired; but the principle of oxygen in the blood is the source from which it radically springs. Without the preservative and renovating influence of this principle, the whole fabric of the excitable structure is subverted in a moment, and we cease to live. When respiration is suspended, we directly feel a torturing sensation about the precordia, which is the sensible symptom of an incipient disorganisation that quickly destroys us. Death however is not always the immediate consequence. Mr. Hunter, in a paroxysm of his fatal disease, experienced a suspension of his pulse for three fourths of an hour, and of his respiration part of that time, until he voluntarily performed it; yet he continued all the common actions of life at the same time, without much inconvenience from these circumstances. And persons who have been hanged or drowned, in whom death proceeds from the loss of the oxygenous influence, frequently retain so much of their excitability, as to be resuscitated by the application of stimulants and oxygen, after a lapse of several hours from their apparent dissolution. An experiment, which shews the utility of this principle in sustaining and repairing the excitability in every part, is performed by passing a ligature round an artery, so as to obstruct the passage of the blood. The part thus deprived of its supply of oxygen and other nutriment, wastes in its substance and becomes paralytic.

The speedy renovation of the excitable structure by oxygen, is accompanied by symptoms similar to those which attend its effectuation by sympathy. It is accompanied by sensations of numbness and twinging. Thus in recovering from a severe fit of apoplexy, in which respiration has been nearly suspended, and the excitability of course subverted, the patient complains of feeling through all his flesh, as he has felt in his foot after compressing the crural nerve. And the same complaint is made by those, who are recovering from an apparent death, caused by the respiration of carbonic acid gas. That the peculiar sensations in these instances, depend on the renovating process caused by oxygen, is proven by an experiment on respiration, which I have frequently performed; and which consists in hyperoxygenating the blood. When vital air is breathed in its purest state, it is proven by the chemists that less oxygen is absorbed, than in breathing the common atmosphere. It is consequently by the respiration of the latter in a rapid and copious manner, that we can surcharge the blood with this renovating principle. As often as I have done so to a considerable extent, I have experienced a sensation of twinging and numbness in the pit of the stomach, precisely analogous to that I have experienced after the compression of a nerve. Why this excess of renovation should manifest itself first in the stomach, depends on principles which we cannot yet develope.

IN violent exercise, the excitability is rapidly exhausted; and a larger supply of oxygen becomes necessary for its renovation and support. This supply is obtained by the rapid and copious respiration habitually performed in such cases. When I voluntarily respired in this manner, without proportionate exertions, as in the preceeding experiment, the excitability was soon so completely renovated, and the blood so copiously charged with oxygen, that I was able to suspend my respiration for two minutes, or three times as long as I could refrain from it after its ordinary performance.

THE oxygen absorbed in the lungs, appears to be expended in the arterial extremities; but whether this expenditure be for the purpose of nutrition or renovation, or in what part of the circulation the oxygen exerts its renovating power, is undetermined, and probably unimportant to us. The most plausible opinion, is that which affirms, that it exerts, without combining, a conservative and renovating influence on every excitable fibre it approaches; and that the effects of this influence are diffused by sympathy over the whole system. Its combination with the fibre to be renovated is probably unnecessary to that end; since the red blood is not intimately diffused through the substance of our most excitable organs, as the brain and nerves, in a quantity proportional to their excitability; though the brain is actually supplied with oxygenised blood in a very large proportion.

The following propositions contain the substance of what I have endeavored to explain and demonstrate in this chapter. 1. Vitalised matter in its most perfect state, is possessed of an organic property called excitability, which is the source of all its proper motions. 2. The action of certain physical principles called stimulants; or a change in the external influence exerted on the system; excites in this organic property a disorganising process, constituting excitement, whose sensible qualities are motion, sensation, and thought: and the whole event is termed stimulation. 3. The remaining state of the fibre is called its fundamental structure; which is capable of having its excitability renovated and preserved, by the action of oxygen on the whole system, and of sympathy on its subordinate parts.

My solicitude to be perspicuous and conclusive on these fundamental topics, has probably rendered me tedious and tautological.

CHAPTER V.

THE DIFFERENT KINDS OF EXCITEMENT, AND THEIR LAWS.

EVERY distinct part in the human system, is constructed for the performance of some particular office in the animal economy, to which it is adapted by its external configuration, and intrinsic structure. The bone which supports the body, and the muscle that moves it, could not effect these different purposes, by similar mechanical forms, and vital powers. The liver, destined to separate the component parts of the blood, and to modify their chemical composition, so as to convert them into the peculiar fluid called bile, must necessarily possess a construction and resources very different from those of the heart, which is only intended to give the blood its mechanical motion.

THE exercise of excitement is generally necessary, in the performance of all the animal functions; and must as necessarily as any other concurring circumstance, be adapted in its nature to the end to be accomplished. The excitement, for example, in the muscles of my arm, by which I am enabled to raise a book from the table, must have peculiar conditions, very different from those belonging to the excitement in the retina of my eye, by which I perceive it. To produce this necessary diversity of excitement, there must be a corresponding diversity in the excitable structure of the different parts. and in the stimulants which operate upon them; for these are the only causes which concur in the production of excitement. The nerve in the organ of sight, and the muscular fibre in the organ of locomotion, must each have its peculiar vital conditions. and be stimulated by its appropriate stimulants, in order that it may perform its peculiar functions. The human body is hence endowed with an endless variety of excitability, adapted to the influence of stimulants equally various; every organ differing from its coadjutor in the economy, not less in these circumstances, than in its permanent structure and configuration.

But all the consequent diversity of excitement, may be comprehended, with sufficient accuracy, in three general classes, termed MUSCULAR, SENSUAL, and SENSORIAL. Muscular excitement comprises the actions of the muscles, which produce all the obvious movements in the system: Sensual excitement embraces all the motions in the immediate organs of sense, which transpire in perception and sensation: Sensorial excitement is peculiar to the brain and spinal marrow, composing the common sensory; or to the mind, according to the dialect of the old metaphysicians. Before investigating the particular laws of each class, it will be proper to notice those which are common to all kinds of stimulation.

I. IT is an universal law, that the energy, or quantity of excitement, is proportionate to the perfection of the excitability, and the force of the stimulants acting upon it.

THUS, when we rise in the morning, the excitable structure is found in its most perfect state throughout the system, in consequence of which, all our movements and perceptions are performed with strength and alertness, though excited only by the ordinary stimulants and motives. The labors of a busy day reduce this state of perfection; and at night we find our actions languid, and our conceptions dull, though still produced by motives and impressions as powerful at least as those experienced in the morning. The degree of excitement produced consequently varies according to the state of excitable structure. It is also correspondent to the force of the acting stimulants; for at any time in the day, if we take a cup of coffee, or a glass of wine; if we hear some good news, or engage in some agreeable transaction; we are immediately conscious of receiving an increase of vigor from the influence of these additional agents upon us.

IN a clear day, if we look through the sash of a window into the sunny atmosphere for a few seconds, without moving the eye, and then look on a white wall in the room; we shall see on the wall, a delineation of the window, in which the lights are darker than the lattice work, and the rest of the wall: and we shall be sensible that the whole impression is less vivid, than that we received on looking into the atmosphere. In this experiment all the conditions of the law under consideration are demonstrated. In looking through the window, the parts of the retina which correspond to its lights, receive a large quantity of rays to excite them, whilst very few fall on those, which receive the images of the lattice work and the surrounding wall. The latter parts therefore, being less stimulated by the light, must retain their excitability in a more perfect state; and when an equal impression on all the retina is afterwards made from the white wall, they must hence act with more energy than the others, producing on a light ground corresponding to the former wall, the delineation of a bright lattice work with darker lights. And thus it is proven, according to the law we are discussing, that the parts, possessing the most perfect excitability, perform the most vigorous excitement, when influenced by the same degree of stimulus. And also, by our consciousness, when looking on the wall, that we experience excitement less energetic, than what we received at the window, corresponding to the smaller quantity of light reflected; it is demonstrated, that the process of excitement is proportionate to the quantity of stimulus applied.

In estimating the force of stimulants, it is necessary to observe, that although each particular action, or process of excitement, is produced by a peculiar stimulus, and by no other; yet, that a variety of others, in consequence of principles that will presently be developed, may concur to enforce, or to enfeeble its influence.

II. Every action, or process of excitement, becomes more easily excited in proportion as it is frequently and forcibly performed.

This law of stimulation is fundamental and important. On it the whole fabric of the human character is materially dependent. It is principally in consequence of the ease, with which we can repeat actions that have once been performed, that we are able to acquire habits personal and intellectual, and to learn the arts of civil life. All our perceptions and motions are at first produced by the powerful influence of external agents; but having once been excited in this way, the facility of repetition, which is a law of their nature, renders them afterwards causable by internal and less efficient means. And thus we apparently become self-moving machines, and carry on long trains of excitement formerly experienced, without much assistance from external causes. In learning any mechanic art, it is evidently by frequent repetition, that the necessary power and adroitness of motion are acquired: and universally to whatever species of excitement, or kind of actions, any person devotes himself, he acquires in proportion to his practice, facility and force in performing them.

When a stimulus is first applied to any excitable organ, it produces a confused, irregular action, or process, accompanied by much sensation, and attention of the mind. By repetition, this process acquires definitude, becomes less affecting to the sensibility of the organ, and obeys with more facility the solicitation of the stimulus. It appears, that on its first application, the stimulus produces an extensive disorganisation, affecting the conditions of the fundamental structure itself: and that repetition, augmenting its power on the excitable, lessens it on the fundamental; it being the nature of the latter to adapt itself to exist uninjured in any physical circumstances, within certain limits, to which it may be exposed. Thus when tobacco is first applied to the palate, it excites extensive disorganisation, producing nausea, vomiting, and even death: by persevering in its use, these deleterious effects cease to ensue; but its stimulating power remains in such force, that all the actions of life seem to languish on its removal; and the unfortunate person is condemned, for his tampering folly, to the constant use of a nauseous, disgusting, deadly weed.

When any new and singular object is presented to the senses for the first time, it makes a strong impression exciting much passion and attention; yet our conception of it is confused, and recollected with difficulty. After repeated and familiar examination, we are less affected by perceiving it; and are able to form a more clear and forcible idea, which we can afterwards recollect with facility and precision. In every instance of excitement, a similar progress might be traced, from the affecting confusion and imperfection of the first occurrence, to the precision, facility, and force conferred by long experience.

The facility of repetition in excitement, which I have thus attempted to illustrate, is a constituent part in the principle of association, whose extensive agency in the transactions of human life will be partially developed in the course of the present treatise.

III. The renovation of exhausted excitability is speedy and complete in proportion to the renovating powers—but it never accumulates, or exceeds a certain healthy degree.

That the repair of subverted excitability is proportionate to the powers by which it is effected, is an identical, and therefore an incontestible proposition. It is only necessary on this topic to add, that the facility of renovation in any organ, corresponds to the facility of excitement; and that, like excitement, it is improveable by repetition. In children, ladies, and delicate persons generally, whose strength is quickly exhausted, renovation is equally speedy, and they are soon able to resume their actions. The pulse in them is quick, and it is proportionally frequent.

When sympathy is strong in consequence of the general perfection of excitability, it seems to act with more celerity and force than oxygen, in renovating those portions of the excitable structure which are most dependent on it. Thus when the retina is fatigued almost to insensibility, by viewing bright objects, the power of sympathy restores it during a few minutes of seclusion: a much longer time is required for repairing the excitability of the red muscles by oxygen, when they have been exhausted by exercise; and the same agent requires a whole night for repairing the general exhaustion of the system incurred through the preceding day.

That excitability never accumulates, or exceeds a healthy degree, will not be readily admitted; for it is contrary to the general opinion of the medical philosophers who have investigated this subject. I think however, that a very brief review of common occurrences will demonstrate it. Every locomotive muscle in the body can rest a day, a week, or even a month, without experiencing the least degree of accumulation ; and all our organs of sense, with the sensorium itself, can rest for any length of time with equal safety. The retina in a few minutes regains its greatest expenditure of excitability ; yet after a whole night of inactivity it has gained no more ; and though we should sleep a week, yet we must rise at last with no more vigor, than we can acquire in eight hours. But the actions thus suspended, it may be said, were not designed to be incessantly performed, and a morbid accumulation of excitability does not therefore ensue their suspension. The arterial system then, and its appendages, the glands and muscles of respiration, are the only parts in which it can occur. But in all the instances of inactivity in these parts, during which the accumulation should be effected, no such event has been observed. Mr. Hunter had a suspension of his pulse for three fourths of an hour, and of his respiration during part of that time only ; yet we are not informed that any excessive action was the consequence. In cholera, the pulse is often entirely suspended in many parts of the body, without any fever being subsequently produced : and in the intermittents generally, the longer, and more intense the cold fit, or period of inactivity, the milder is the subsequent paroxysm of fever ; which could not be the case, if it were caused by a morbid accumulation of excitability in the chill. In tetanus on the contrary, the most excessive excitement occurs in the large muscles, in which a morbid accumulation can never be suspected. I am confident, that I could demonstrate in a pathological argument, that diseases always proceed from fundamental disorganisation; and the excessive excitement frequently accompanying them, from a morbid state of the excitable structure very different from a simple accumulation of excitability.

In analysing the different kinds of excitement, I shall begin with the muscular; its properties being the most obvious to the senses, and easy of examination.

A MUSCULAR contraction consists in a peculiar change of structure in the elements of a muscular fibre, which is accompanied by an approximation of its particles, or condensation of its substance. How any change of organic structure, should produce this mechanical effect of approximating the particles to each other with great force, it may exceed the ingenuity of man to explain. Our senses appear to be unable in any instance, to apprehend the intrinsic energies of matter by which its effects are produced. In the sphere of causation, all our discernment and knowledge depend on our experience of palpable circumstances and results. Our utmost perspicacity of inspection and acuteness of reasoning, are wholly unable to infer the consequences of any state of things entirely new. Experience alone is the basis of prophetic science, and the foundation of that philosophy, in which the motions and changes of nature are discussed. It should not therefore be deemed more extraordinary by us, that a change in the excitable structure, should collaterally produce a condensation of substance, or muscular contraction, than that intense heat should be accompanied by light, or one billiard ball move another by impulse. In either case, we can discover some qualities of the materials concerned; but the latent energies on which the effects are essentially dependent, are equally inscrutible. It has already been established, that organic matter can possess no peculiar powers exclusive or independent of its organisation; that excitability itself is an organic property; and that excitement is a peculiar disorganising process, whose sensible qualities are muscular motion, sensation, and thought: it is therefore unnecessary, with respect to these matters, to pursue a speculative enquiry which *must* result in useless conjectures.

THE process of a muscular contraction, cannot be sustained for any great length of time. The subversion of excitability in which it consists, very soon reaches its completion. When the contraction ceases in consequence of this event, or the removal of the exciting cause; the fibre is left, or relapses apparently into its former state, termed relaxation, in which its elements resume the expansion, or elongation, natural to their permanent or fundamental structure. An entire muscle in this state of relaxation, constantly adapts its length to the casual distance between its origin and insertion in the skeleton. It is never rendered tense by extending, nor loose by approximating those points, within reasonable bounds. To understand this fact, it is necessary to recur to the anatomical construction of a muscle. We learn from microscopical dissections, that a muscle is composed of bundles of fibres, enveloped in an elastic cellular substance, which binds them together; that these bundles may again be unravelled, and shewn to possess the same structure; and that the ultimate fibrils, scarcely discovered by the microscope, are alone free from this intermixture of cellular substance. When these fibrils were exposed in their cellular envelope, Dr. Monro discovered, that they had a waving or zigzag direction, which they lost, and became rectilinear when stretched. It is consequently the elasticity of its cellular substance, exerting a constant but gentle force, which adapts the length of a muscle to the distance between its origin and insertion. The relaxed state of the moving fibre itself, is hence an unit with respect to its length; except perhaps the effect of some elasticity, which it may possess in common with other kinds of matter. As soon as it ceases to contract, it acquires its greatest length, lies convoluted in the cellular substance, and is stretched only by the utmost elongation of the parts.

The extent of contraction performed by a muscle, or the degree of approximation which its particles can accomplish, is very considerable. In the intestinal and some other muscles, it is astonishingly great. In a spasmodic contraction of an intestine, its diameter is nearly or entirely obliterated; in which case its fibres must have contracted perhaps nine tenths of their greatest length. The large straight muscles attached to the bones, are prevented by them from any great extent of action, until this obstacle is removed by a fracture. They are then excited by the violence they suffer, to contract much farther than their customary degree. That the shortening of their length in such cases, proceeds from muscular excitement, and not from cellular elasticity, which is too weak and confined to produce so great an effect, is proven by a case of fracture, that occurred to De Sault; in which, the nerve being compressed by the accident, no contraction ensued, until the compression was removed.

The strength of a muscular contraction is more extraordinary than its extent. The powers which the muscles attached to the skeleton exert on many occasions, are truly astonishing, if we may credit the mathematical calculations made by the mechanical physiologists. A muscle which weighs only two or three pounds, they seem to have proven very clearly, can exert a force sufficient to raise as many thousands. The attraction of the particles to each other, during the process of muscular excitement, must consequently be much greater than at any other time, or than any other combination of the same elements can possess.

The excitability of the muscular system in man, depends for its preservation and repair, on the nerves and arteries which are ramified through the muscular substance. The sympathetic influence, is conveyed through the medium of the nerves; and the element of oxygen is supplied by the arteries. The obstruction of either channel, is highly detrimental to the muscular power. When an artery is destroyed, the muscle it supplied languishes, decays, becomes paralytic, and ultimately mortifies. The power of sympathy is less fundamental and important. For when the nerve is destroyed, the excitability of the muscle it supplied is immediately impaired, but not wholly subverted: and if paralysis, notwithstanding the supply of oxygen, be ultimately produced, yet the fundamental structure remains measurably unimpaired.

In the common actions of life, the muscular excitement necessary, is inconsiderable and of short duration, when compared with what the muscles can actually perform; the expenditure of their excitability is hence very small, when the period of inactivity recurs, in which the influence of oxygen and sympathy effect its renovation. The alternation of excitement and inactivity in some parts is very frequent, as in the heart and muscles of respiration. But in no instance is there any exertion continued, without an equivalent interval of rest for the operation of the renovating principles. Muscles designed by nature, or compelled by necessity, to sustain a great quantity of excitement, acquire an excitable structure possessed of both strength and mobility, with a corresponding facility of renovation, and in general with an extraordinary supply of the renovating principles. The heart for example, which performs the most frequent and forcible contractions, is the most strong and excitable muscle in the body, and is impregnated with a larger quantity of oxygenised blood, than any other part of equal size: and any other muscle whatever, that is impelled to uncommon exertions, becomes at once more red, robust, and excitable; so that a skilful anatomist may know, from the appearance of such parts in dissection, to what kind of mechanical labor the subject has been devoted.

The excitement of the muscular system is derived from a variety of sources, and its actions have been divided into corresponding classes; but as this classification was made by persons imperfectly acquainted with the subject, it is inaccurate and useless. It is a fact, perhaps without an exception, that every kind of excitement was originally derived from the influence of external stimulants: but in most instances, the actions thus produced become afterwards excitable by other means to be explained hereafter. The greater part of our muscular motions, completely answer this description. Those muscles particularly, which are attached to the skeleton, and employed in locomotion and the mechanic arts, depend as much for their excitement, as for the perfection of their excitability, on the nervous system; from which they derive it by simple association, or the more complicated mode of volition.

A number of other muscles, as the heart, arteries, glands, intestines, &c. still continue to be excited by the direct action of their stimulating contents; the blood vessels by the blood, the glands by the fluids they secrete' and the intestines by the aliments we have eaten. But the actions thus produced, are also invigorated by the excitement of the nervous system derived into these parts. Thus when the nerve of the heart is cut. its languishment proceeds from the obstruction of excitement as well as of sympathetic influence derived from the sensorium. This is proven by the renewal of its action, when the end of the nerve attached to it is stimulated. It is also proven by the influence, which the ideas and sentiments of the mind are known to possess over the actions, not only of this organ, but of the stomach, and others which are commonly excited by external means.

MUSCULAR excitement is hence derived from two sources only, which are entirely distinct; from the direct stimulation of physical principles; and from association, either simple or complicated in the manner of volition. By the latter, the muscles attached to the skeleton principally derive their excitement from the sensorium; whilst all the other muscles in the system are principally actuated by the former. The motions produced by the direct action of a stimulus, and the muscles usually excited in this manner, were supposed by Mr. Hunter, to be more vigorous than those which depend on association. And this opinion is probably true; but it can neither be proven by exciting the same muscle in these different ways, nor by applying the same stimulus to different muscles; for there is something peculiar in the excitability of every part, which adapts it to be more affected by some particular stimulus, than by any other of equal force. The opinion of the same physiologist, that relaxation is an essential part of excitement, and is produced by external agency, is neither plausible nor correct. By examining the operations of the muscular parts which he has mentioned, I could demonstrate the absurdity of his doctrine; but I deem it unnecessary in a work of this description.

FROM this review of muscular excitement, it appears, that the contraction of the fibre, though it may be a singular, is yet a simple event. Every thing material concerning it, may be comprised in a few propositions. 1. Every perfect fibre is possessed of an excitable structure, or a portion of excitability. 2. By the action of a stimulus, or the principle of association, this structure is disorganised in the manner of a muscular contraction. 3. When this process ceases, in consequence of the total subversion of the excitability, or the removal of the exciting agent, the fibre relapses into its natural state of relaxation; and is then prepared for another contraction, by the renovation of its excitable structure, under the influence of oxygen and sympathy, applied through the nerves and the arteries.

CHAPTER VI.

THE SAME SUBJECT CONTINUED.

In the muscular system, whose excitement has just been the subject of attention in the preceding chapter, a considerable variety of excitable structure may be shown to exist. The simple event of a muscular contraction, seems indeed to be invariably the same specific process. Whether it occurs in the heart, or a muscle of the arm; in the diaphragm, or the stomach; it exhibits externally the same uniform character: but the variety necessary in its causation, demonstrates, that its intrinsic insensible conditions are different in every instance. There is always something peculiar, in the natural stimulation of each muscle, whether the efficient cause be physical agency or association; which proves, that its excitability is peculiar, and different from that of any other muscular part.

In the organs of sense, whose excitement is next to be investigated, the diversity of structure is still greater and more obvious. In their anatomical construction, they mostly possess a double order of parts, formed for different purposes; a nervous substance, which is the immediate seat of sensual excitement; and an apparatus of parts subservient to the application of the stimulus. In the eye, for example, the retina is the immediate seat of vision; whilst all the other parts of that elaborate and beautiful organ, are merely intended to effect the proper application of light to the former, and to protect the whole fabric from external violence. In the ear, the immediate, and the external organs of hearing, are equally as distinct and complex as those of the eye, but entirely dissimilar in their anatomical configuration. The other senses. again, of taste, smell, and touch, have immediate and external organs entirely different from the former, but more simple and analagous to one another.

This diversity of anatomical construction, so obvious to the senses in these parts, is not more considerable, than the intrinsic difference of excitability in their immediate organs of sense, as indicated by the peculiar kinds of stimulation to which they are respectively adapted. Thus, in the eye, the immediate organ is naturally adapted to be excited by the impulse of radiant light only; in the ear, by the vibrations of the atmosphere; in the organ of touch, by the mechanical impulse of solid bodies; and in the organs of taste and smell, by the chemical qualities of certain fluid and æriform substances. The excitement resulting in each case, is also peculiar, and distinct from every other. The cognizable conditions of a muscular contraction, we remarked, are invariably the same in all the muscles. In the sensual excitement of different organs, on the contrary, the circumstances apprehended by the mind are extremely dissimilar. The perceptions of light and sound, for example, have so little analogy in their respective qualities, that we can scarcely institute a comparison between them. There must consequently be a great dissimilarity in the excitable structures, in which those dissimilar actions occur.

The final cause of this diversity in the configuration and excitability of the organs of sense, is the apprehension of all those different qualities of external things, the knowledge of which may be useful in the pleasurable support of human life.

Physiologists and metaphysicians, commonly enumerate five senses in the human system; viz. the senses of sight, hearing, touch, taste and smell. Scientific accuracy seems to require a different classification of our sensitive powers. It requires, that they should either be comprehended under four, or extended to six different heads. Seeing, hearing, and touching, are evidently distinct and peculiar sensual actions; and must therefore constitute three distinct senses. Tasting, smelling, and *feeling*, on the contrary, are so analogous in some respects and dissimilar in others, that they may either be considered as varieties of one, or as constituting three other distinct senses. The power of feeling again, is so diversified in the different parts of the body, that, if we pursue the separating plan, it is difficult to say, whether we should not enumerate even more than six separate senses.

The sense of sight, residing in the eye, is the most elegant and useful. It is the principal source of the pleasures of taste, or imagination; and it furnishes nearly all the ideas, which are the subjects of science and philosophy. It is daily the medium of our most extensive and important intercourse with external things. Colour is its peculiar object, or the characteristic feature of all its excitement.

The organ of hearing is conversant only with sounds. By it we can obtain the ideas of number, magnitude, and duration; for these are properties of sound itself; but it gives us no other scientific ideas, or direct information, concerning any other property of the external world. The association of its actions, however, with those of the other senses; as in the case of spoken language, and of the natural sound produced by every object; renders it extensively useful in the general conduct of life. Its perceptions too, are the immediate subjects of musical science, and are in this way the source of much elegant and intellectual pleasure.

The sense of touch, extending over the whole surface of the body, informs us of the mechanical and mathematical properties of matter: but as its perceptions are more slow, and dull, and inaccurate, than those of sight produced by the same objects, we are accustomed to use them only as a medium of association, to suggest the latter, and other ideas, and to excite muscular motions. The physiological opinion, that the intellectual attainments of different animals correspond to their perfection of touch, appears to me extremely preposterous. It probably originated from confounding the ſenſe of touch, with the ſenſitive power of feeling, or general *ſenſibility* of the animal ſyſtem, the perfection of which pre-eminently contributes to ſuperiority of intellect.

The ſeats, phenomina, and analogies of taſte and ſmell are ſufficiently known. The information they are deſtined to furniſh, is uſeful to the individual in many perſonal reſpects; but they furniſh very few philoſophical materials, except for the ſcience of human nature, in which they diſplay a variety of facts. The moſt eſſential characteriſtic property of their excitement, is pleaſure and pain.

The ſenſe of feeling is diffuſed through every fibre of the ſyſtem; through every part at leaſt which has any excitability; and varies according to the ſtructure and function of the organ in which it is ſituated. It is ſtimulated by heat and cold; by mechanical violence and chemical acrimony, originating in the body or applied externally; and in fact by nearly every ſtimulus which can affect us in any way: for when any part, whether an organ of ſenſe or a muſcle, is excited by its appropriate ſtimulus, its inherent ſenſibility is very generally affected in ſome degree by the ſame agent. The excitement of this ſenſe, is the principal ſource of all our pleaſures and pains; of all the happineſs and miſery allotted to mankind. The contributions from the organs of taſte and ſmell; which make up the remainder in the general fund of ſenſation; are trivial, when compared with all the feelings originating in this ſenſe, or dependent on the ſenſibility of the mind itſelf.

From this brief review of sensual excitement, it is evident, that all the actions of our organs of sense, may be usefully divided into two distinct classes, denominated PERCEPTION and SENSATION. All the actions of these organs, which we are instinctively, or habitually, induced to regard as the types of things external, or as things external themselves, and which become to us the elements of science, and the precepts of art; will constitute our perceptions. Other sensual actions, which we are more readily induced to regard as affections of the organ itself, and which give us no philosophical information of the exterior world, but merely affect uswith pleasure or pain, may properly be termed sensations. The eye, the ear, and the organ of touch, are principal sources of the former; whilst the latter originate in the senses of taste and smell, and the sensibility, or power of feeling, resident in every part of the system.

I WOULD observe in this place, that mathematical precision must not be expected, in any classification of natural appearances. They all run imperceptibly into one another. In passing the eye along the prismatic spectrum of a solar beam, we are able to enumerate seven distinct colors; but on minute inspection, we are unable to mark the precise point where any one begins or ends. So in sensual excitement, we can clearly perceive, that the action excited in the finger by the caloric of a burning candle, is a sensation; and that the action excited in the retina by its light, is a perception; yet an intermediate process might occur, which would equally belong to either description. Thus it would be difficult to say, whether colours and sounds abstractly considered, should be referred to sensation or perception as defined above: for in the mind, they are not properly the scientific representatives of any thing external, nor are they intrinsically pleasant or painful. I shall however consider them as perceptions, intending to retain no action under the head of sensation, which is not essentially pleasurable or painful, agreeable or disagreeable.

This division of sensual excitement, is fundamental and important, in the philosophical analysis of human nature. It is necessary that it should be clearly understood and remembered.

The intrinsic nature, and the laws, of sensual action, should next be investigated. The ingenious Darwins have related many experiments and arguments, demonstrating the activity of the organ in sensual excitement; and rendering its fibrous contraction very probable. I shall not repeat their arguments, but relate a fact, which proves, that in the excitement of the retina, at least, there is fibrous contraction, similar to that occurring in the excitement of the large muscles. It is necessary to premise; that if a small portion of the retina should contract like a muscle, it must draw the surrounding parts towards its centre; and that a straight line, can only appear straight to the eye, when its image is formed on those points of the retina, which in the natural state of that organ lie in a straight direction. For instance; in viewing a straight line, if any part of the retina on which its image is drawn, should be displaced, and another part brought to receive a portion of the image, the line would no longer appear straight, but bent according to the natural direction of the parts on which its image is thus thrown. In experimenting on occular spectra, when I first read Darwin on that subject, I imprudently exposed one of my eyes so long to the sun, that his spectrum still remains in it. When I draw a line on blank paper, and move my eye upon it so as to carry this spectrum over the line, I can perceive that the line recedes considerably where the spectrum approaches it, becoming crooked in that part: and as soon as the spectrum has advanced, so that the direction of the whole line runs through its centre, the crooked part suddenly crosses it to the other side, and appears bent in a contrary direction; and then gradually becomes straight as the spectrum moves from it. In this case, the fibrous contraction in the spectrum, draws the adjacent parts towards its centre, so as to displace them: consequently when the image of the line approaches the spectrum, it passes through the displaced parts, and falls no longer on points, which, in the natural state, lie in a straight direction, but on others more remote from the centre of the spectrum, and therefore appears to recede from that centre, or to become concave towards it, as far as the influence of the contraction extends. It appears, that Dr. Reid experienced and recorded a chronic spectrum, completely similar to this in every material circumstance. From these facts we may rationally conclude, that some degree of fibrous contraction occurs in every process of sensual excitement.

The excitability of each immediate organ of sense, is adapted to be stimulated by some peculiar agent, or quality of external things. The retina is naturally stimulated by light, and the auditory nerve by vibrations in the air; nor can any other agent originally excite them. But these peculiar stimulants possess a diversity of qualities, or modes of existence, and produce in the organs they stimulate, a corresponding diversity of excitement. There are at least seven distinct kinds of light, which produce as many simple colors in visual perception; besides an infinite variety of shades, by being variously compounded together. In sounds, the ear can distinguish seven distinct grades of tone, which constitute the gamut of music; and the body of every sound, which can be produced, has some peculiarity depending on the nature of the sonorous substance producing it. The organs of taste, smell, and feeling, which are stimulated by the chemical qualities, and mechanical impressions of matter, can perform a much greater diversity of action, corresponding to the infinite modifications of these agents. Our senses indeed would be nearly useless, if unable to apprehend the nice modifications of the objects which excite them.

There is in this respect, a very striking difference between muscular, and sensual excitement. A muscular contraction, in any individual fibre, appears to be invariably the same specific process; or at least never exhibits any sensible change on any occasion. The process of excitement in the same organ of sense, on the contrary, is capable of endless modifications; or the organ is capable of innumerous modes of action; corresponding to the nature of the stimulus which excites it.

Having briefly investigated the nature of sensual excitement to this point, it will now be proper to deduce those general principles by which it is governed. In doing this, I shall confine myself chiefly to the organ of sight, on which experiments are most easily made and understood. The art of vision, or the mental habit of inferring distance, magnitude, and figure, from shades of color and divergency of rays, has been ingeniously investigated by bishop Berkely in his theory of vision. The intrinsic nature of visual excitement, has been analysed with equal success by Dr. Darwin of Shrewsbury: and from his paper on occular spectra, published in the Philosophical Transactions of London, I shall copy the experiments, which demonstrate the subsequent laws of sensual excitement.

I. The general laws of stimulation; that excitement is proportionate to the stimulus and the excitability; and that it is facilitated by repetition; are handsomely proven by numerous experiments on visual excitement.

A certain mediocrity of exertion in the retina, is necessary to distinct vision. We can see clearly, neither by a small, nor a great quantity of light: in moonshine, our perceptions are obscure and confused from a deficiency of stimulation; and in the meridian sunshine, they are often confused, and the eyes painfully dazzled by an excess. To remedy these inconveniences as far as possible, by obtaining in all situations the necessary mediocrity of light, the contraction of the iris, is associated with the excitement of the retina, so that the latter being too much excited, the former contracts, and by thus diminishing the pupil, excludes the superabundant rays.

In a clear winter's day, when every thing is covered with snow, having sat with closed doors and muffled windows, until the retina has become highly excitable; on going into the open air every object appears so bright, that we are unable to behold it. The iris soon contracts to the utmost degree, yet the perfection of excitability, and the quantity of light still admitted, are excessively great; and therefore an excessive, painful, excitement is produced. But having remained some time in this brilliant light, the excitability becomes so much reduced by action, that the retina can sustain the excessive stimulus, without being excited to an unpleasant degree of exertion. If we now return to the dark closet whence we issued, we shall experience a contrary kind of inconvenience. The iris immediately relaxes, and the pupil expands; yet all the feeble light that can possibly enter, is inadequate to excite distinct vision in the exhausted retina, until a sufficient time has elapsed for its renovation.

Place a square piece of white paper on a black hat, look steadily on its centre for a minute, and then transfer your eyes to a sheet of white paper, and you will directly discern a dark square on it, corresponding to the paper on the hat. Again, place a black square on a sheet of white paper, and having beheld it a minute, transfer your eyes to another sheet, and you will distinguish on it, a square more luminous than its other parts. In the former case, a relative exhaustion, and in the latter, a relative renovation, of excitability, is produced in the part where the image of the square is formed on the retina; and therefore in the one case it is prepared to perform a greater, and in the other a less degree of action than the rest of the retina, when subsequently exposed to one common degree of stimulus.

THE improvement, or facility of excitement, universally acquired by practice, is very obvious in the organ of sight. Painters and nice artists in general, who are ever making nice observations with their eyes, acquire uncommon perspicacity and precision in their visual perceptions.

II. THE organs of sense are capable of different kinds of action, according to the different kinds or modifications of their peculiar stimulants; and when any of these stimulants are compounded, or applied in conjunction, they produce an intermediate species of excitement, between those kinds produced by them separately.

THUS when two kinds of rays are admitted into the eye together, they excite the perception of a color, intermediate to those, which are peculiar to them separately. A composition of red and yellow rays excites the perception of orange, which is the color situated between red and yellow in the prismatic spectrum. The admission, again, of yellow and blue rays together, produces the intermediate color green. Dr. R. Darwin painted the four prismatic colors, yellow, green, blue, and indigo, circularly on a circular piece of pasteboard, in the proportions which they occupy in the prismatic spectrum; except that the yellow and indigo were extended to occupy the places of the adjacent orange and violet. The pasteboard was then whirled rapidly on its axis, so that rays from all the colors were thrown almost simultaneously on the same part of the retina in beholding it. The whole pasteboard then appeared of one color, which was dark green, or the intermediate central shade of all the colors employed.

In books of philosophy, we frequently see the seven primary colors, painted on a circular area in prismatic order and proportion. The seven primary perceptions they excite, may be considered as forming a corresponding circle, or succession, of actions in the retina. If we select any two colors, or kinds of rays, in this circle, and compound them; they will produce a perception of the color; which occupies the nearest intermediate point of the circle. Thus if orange and green be selected, the nearest intermediate point is covered by yellow; which is therefore the color their combination will produce. Between red and indigo, the nearest intermediate point is covered by violet; which is therefore the color that will be produced by their mixture. If two shades be selected, which are opposite to each other, and which therefore have two intermediate points equally near, but covered by contrary colors, the result of the mixture will correspond to the stronger one. Thus red and dark green, are opposite in the circle, and the intermediate points equally near, are covered by shades of orange and indigo; but orange is the stronger color, and will therefore be produced by the composition of red and green rays: but if a portion of blue, indigo, or violet should also be admitted, the resulting colour would then be some shade found on that side of the circle, from which this portion was taken. In these compositions we suppose equal quantities of the rays to be taken: otherwise the color produced would be found nearest to that of which the greater portion was admitted.

SIMILAR effects occur in the stimulation of other organs. If a mixture of various sapid substances be applied to the palate, it will not taste like any one ingredient, nor like them all; but will excite an intermediate kind of flavor. Thus a mixture of vinegar and sugar, is neither sweet nor sour, but has an intermediate relish between them. The intimate concurrence of two similar sounds of different acuteness, will also cause them to coalesce in the ear in a considerable degree, and produce an intermediate tone. But in these compositions of stimulants, the effect produced rarely possesses such unity, that it may not be analysed by the attention of the mind, and the various ingredients discovered.

III. EVERY process of sensual excitement has a tendency to continue after the stimulus is removed; and this tendency is proportionate to the remaining quantity of excitability, and the violence of the preceding stimulation: it is also greater, as the extent or portion of the organ excited is less.

WHEN a fire coal is whirled round briskly in the dark, it appears to the eye to be a burning hoop; because the action of the retina excited in any part of its circuit, continues until it returns to the same place, and renews the impression. When we look steadily for a short time at the blaze of a burning candle, and then close our eyes;

a distinct and bright image of the flame is perceived for many seconds. In these cases, the remaining excitability is great, but the force, or violence of the stimulation is inconsiderable, and therefore the excitement soon subsides on the removal of the stimulus.

WHEN the impression from the burning candle is continued longer, or a stronger stimulus, as the rays of the setting sun, is applied, until a greater degree of exhaustion is produced; the spectrum or image of the object, in consequence of such violent stimulation, will continue a longer time, and when it vanishes, will again re-appear in some cases repeatedly. In these instances, the energy of the preceding stimulation gives the excitement a great tendeney to continue; but the expeaditure of excitability is also so great, that intervals of inactivity for its renovation become necessary.

SIMILAR phenomina occur in the other senses. The sensation of heat will continue for a length of time in proportion to the violence of the impression. I remarked, when a child was scalded on its hand, that the pain continued incessant for more than an hour; and then ceased and recurred alternately for some time, until it vanished altogether; resembling the spectrum of the sun above described. The excitement of the palate generally continues for some time after the sapid stimulus is removed; the sick sometimes complain of a nauseous medicine for hours, and even days after taking it. The perception of a sound is more evanescent: but it is difficult to prove the length of its continuance, for we can rarely determine the moment of cessation in its external cause.

In some cases however, we may discover that it does continue after that moment.

When the part of the organ stimulated is small, the action has a proportionally greater tendency to continue: for the power of sympathy must be greater, in renovating a small, than an extensive subversion of excitable structure. Dr. R. Darwin mentions, that in performing some of his experiments, he looked so long on the meridian sun, that he retained in his eye the spectrum of that luminary during the two succeeding days. By a similar procedure several years ago, I excited a spectrum, which, as I have already observed, still continues in my eye. These chronic spectra sometimes recur spontaneously to the attention of the mind; but in general, they are only recognised when we voluntarily observe them. During their intermissions the excitability is speedily repaired for their repetition. I have remarked too, that there is not at any time a steady incessant exertion. The image always appears to glimmer, or possess an intestine commotion like the quivering of heated air; which is caused by partial and short intermissions, during which alone renovation might be effected. Or perhaps excitement and renovation may progress together. But in whatever way we may account for their extraordinary continuance, it appears to me very certain, that no energy of stimulation could excite a *chronic* action in the whole organ, or in any large portion of it: paralysis would sooner be produced.

Similar to the chronic spectrum in the organ of sense, is that partial and energetic excitement of the brain, that produces the *obstinate belief* in some foolish proposition, which is the principal symptom of mental derangement.

IV. When any organ has been excited into one kind of action for a short time any other kind which it commonly performs, may immediately afterwards be excited with unusual facility; or some one will even commence spontaneously.

This law is a necessary consequence of that just discussed. When any organ is once excited, it has a tendency to continue in the state of activity. It most naturally continues the action which it is already performing in obedience to the stimulus that was applied. But this action has already reduced the peculiar modification of excitable structure, necessary to its continuance: the influence of a new stimulus changes it to another kind, whose excitability is more perfect, and in which the propensity to action can thence proceed with renewed vigor.

Place a small square of red silk on a black hat, and having steadily beheld it for a few seconds, remove your eyes to a large piece of green silk, and you will percieve on it a small square, corresponding to the former, of a brighter hue than the adjacent parts. In this experiment, the red rays which penetrate the retina in the first instance, excite its action and give it a propensity to continue in activity; but they also exhaust the excitable structure adapted to the perception of the color red. On the admission of the green rays, the mode of action in the part previously excited, is changed into another which it is abler to perform, whilst its propensity to exertion continues undiminished; this propensity therefore in conjunction with the new stimulus of green rays, enables it to perform a stronger action, or more vivid perception, than the rest of the retina excited by the same stimulus.

PLACE a piece of colored silk on a sheet of white paper, look steadily on its centre for a minute, and then transfer your eyes to another part of the paper, and you will discover a spectrum on it, shaped like the silk, but of a contrary color. If the light reflected by the silk has been sufficiently strong, or long enough admitted to the retina, the spectrum will be seen when the eyes are closed. Red silk produces a green spectrum ; orange produces a blue, and yellow a violet one ; the color of the spectrum being constantly opposite, in the circle of prismatic colors, to that of the silk employed. In these experiments, for example when the color of the silk is red, the rays admitted to the retina excite the peculiar action which constitutes the perception of red. until the modification of excitability necessary for its performance is nearly exhausted ; and the organ during the same time acquires a great propensity to exertion : when therefore all kinds of rays are afterwards reflected upon it from the white paper, it proves to be nearly insensible to the red, and preternaturally sensible to all the others ; and consequently commences that kind of action, which is excited by a compound of them all except the red, and which is found to constitute the perception of green. When the stimulation by the red rays is sufficiently violent, it produces in the retina such a disposition to activity, that it continues in action after they are witheld ; but its power of perceiving the color red being exhausted, it necessarily falls into a contrary process, constituting the perception of green. When the action or process of excitement, constituting the perception of any color, has continued till the power of performing it is exhausted, every other kind of action incident to the retina, becomes equally excitable; and the reason why the opposite or contrary kind, commences spontaneously in preference to any other, is to be found in the law of compound stimulation. If all the solar rays except the red, be compounded, as in Darwin's experiment already mentioned, they excite the perception of green: so if all the processes, which they separately excite, acquire a disposition to commence spontaneously, the effect must be the same; the color green must be spontaneously perceived. These principles are further illustrated and proven by the following experiment, in which the degree of stimulation is still greater than in the one last related.

LOOK steadily for a minute or more on an inch square of pink silk, placed in a bright sunshine, at the distance of a foot from the eye; then closing and covering the eyelids, a spectrum will be seen, which is at first of a dark green color; then having disappeared, it recurs again and is blue; then after a second disappearance it becomes yellow; and lastly, it becomes red. In this experiment, the violence of the stimulation gives the organ a great propensity to exertion; but the process constituting the perception of red, has already exhausted the peculiar excitability necessary to its continuance, and it consequently can no longer be performed. All the other processes have become equally excitable and ready to transpire, and therefore balancing each other, the intermediate species of green is permitted to commence; and having continued until its peculiar excitability is reduced, it again disappears. The tendency to action still continues in the organ, and the opposite modes of red and green are now exhausted. On one side of the circle, the colors orange and yellow, and on the other, blue, indigo, and violet, remain excitable: the latter being the strongest prevail, and the spectrum recurs in a shade of blue. This, like its predecessor green, continues a while, vanishes, and is succeeded by yellow: and finally, the first kind of exhaustion being now repaired, the spectrum becomes red.

THE alternation of opposite kinds of action, which thus occurs in the organs of sense, may be termed a LIBRATION of excitement.

A MORE extensive examination of the excitement of the senses in general, would more amply illustrate, and firmly establish, the general applicability of the laws we have now discussed. If it would not form a digression too tedious and intricate, I could shew, by analysing the phenomina of music, that these laws obtain in the ear, and regulate the production of sonorous excitement. But I trust they are sufficiently explained and proven. An attentive application of them will enable us to solve many problems in metaphysics and human conduct. A knowledge of them is also important to the physician, whose skill must often be employed to regulate the general excitement of the system. On the last that was considered, depends that important medical precept, which inculcates an alternation of stimulants in cases of great debility. When a stimulating medicine, for example, is taken into the stomach, it presently exhausts the peculiar excitability in that sensitive organ, which it is calculated to affect, and then ceases to produce excitement; if a different one be then taken, it will produce an equal, or a greater degree of action than the first; just as the application of green rays after red, produces great exertion in the retina.

THERE is one important fact in sensual excitement, which yet remains to be mentioned. It is this, that sensations are universally more permanent than perceptions. The common impressions made on the retina, and the auditory nerve, cease to be perceived immediately on the removal of the cause which has made them; whilst the most trivial impression made on the palate, or sense of feeling, continues to affect us for some time. This, like most other traits in the human character, is probably the effect of habit. The succession of the stimulants, which excite the eye and the ear, is incessant and quick. One sound is continually supplanting another; and the eye glances in an instant, over the whole visible hemisphere. The action excited by one stimulus, is thus immediately arrested by the application of another. The succession of stimulants, which excite the organs of taste, smell, and feeling, is incomparably more slow. The principal organs of perception, may hence acquire more facility in assuming, and suspending their different actions, than those which are employed in sensation.

A FEW brief remarks on the nature of sensorial excitement, may conclude the subject of the present chapter. It should be recollected, that when the term mind occurs in this work, it signifies the excitable structure of the brain.

ALL the excitement of the sensorium is derivative: it originates in the organs of sense. When any organ is stimulated, the resulting action is not confined to it alone, but passes along its nerve to the brain, and diffuses itself in that great nervous substance. This invariable tendency and result of sensual excitement, can only be explained by considering it a fundamental law in the organic structure of the nervous system. The immediate seat of sensual excitement, and the substance of the sensorium, apparently possess the same kind of organisation and excitability; and the derivative excitement of the latter, is doubtless a faithful type, or a correct repetition, of the primary action in the former.

EACH organ of sense, and each part of it, has a particular portion of the brain appropriated to participate in its excitement, or to repeat its peculiar actions. This is a general fact, which may easily be demonstrated by experiment. When two different kinds of rays, as yellow and blue, are admitted together to the same part of the retina, they excite but one individual kind of action, which is peculiar to neither, but intermediate between them, constituting the perception of green; which passes along the optic nerve, is repeated in the sensorium, and is there mentally recognised as an individual action: consequently neither the same part of the retina, nor of the sensorium co-operating with it in perception, can perform two distinct actions at the same time, though excited by two distinct stimulants. But when the blue and the yellow rays are applied to different portions of the retina, they excite the perception of two distinct colors; consequently the actions of these different portions of the retina, must be repeated by different parts of the sensorium. It might be imagined, that although the retina cannot, yet that the sensorium may be able to perform at once two distinct actions in the same part; and that in the latter experiment, the distinct actions excited in different parts of the retina by the colors employed, were actually repeated together by the same part, or by the whole, of the sensorium. But this supposition is improbable, and is contradicted by the following experiment. Take a small bit of pasteboard painted red, and another of the same shape and size painted green; then directing the eyes to an object at the opposite side of the room, hold these bits of pasteboard, one on each side, at small and equal distances from each eye respectively, and approximate them to each other, until the nearest of their double images perfectly coincide so as to form but one; this image will then appear either green or red, according as the attention is directed to either of these colors; and by nice management, and a strong effort of attention, it may also be seen of the intermediate color yellow, or light orange. This will be a nice and difficult experiment to those who are not familiar in these matters. To understand it clearly, it is necessary to recollect, that the similar actions, excited in the corresponding parts of the different retinas by the same object, are obliged in extending to the sensorium, to pass through a common part in the intersection of the optic nerves, in which they coalesce so as to *unitise* the perception. In this experiment, the dissimilar actions excited in corresponding parts of the retinas, are either recognised alternately, or they coalesce into an intermediate kind; which proves that the same, or even the corresponding parts of the sensorium, cannot perform two distinct actions at the same time. Viewing a white object through spectacles, whose glasses were differently colored, would be a more appropriate experiment to elucidate this point.

It is probable, that the boundaries of the sensorial departments, allotted to the respective senses, to co-operate with them in perception, by reiterating their peculiar actions, are not established in the brain with much precision. It is at least certain, that although the department for the ear is wholly unable to repeat the actions of the retina, and the contrary; yet the departments for all the senses have a general communication of excitement; for action in one may be made to excite any other by association.

It has been proven, that fibrous contraction accompanies the process of sensual excitement. From the effects of pressure on the brain, it is probable, that the same attribute belongs to sensorial excitement. Unless some kind of *mechanical* motion in the substance of the sensorium, were necessary in its excitement, it is improbable that the process would be retarded, and even suspended, by the influence of *mechanical* compression.

As all the sensorial actions are derived originally from the senses, it follows, that they must be subject to the laws, which govern the sensual excitement from which they are copied. On this topic, it is therefore only necessary to refer to the preceding discussion of those laws.

But although sensorial excitement, is originally derived from the sensual, and is constantly governed by its laws; yet it presently becomes independent of this source, or causable by various kinds of association. When thus produced however, it is strikingly different from that which is copied immediately from the senses, or conjoined with their actions as an integral part of sensation and perception. It has much less vivacity, precision, and force.

All the actions of the organs of sense, have been divided into two classes, termed sensation and perception. A corresponding division must now be made in the sensorial motions, which are derived from them, under the denominations of SENTIMENT and IDEA. A repetition of the sensorial part of a perception, constitutes an idea: and a repetition of the sensorial part of a sensation, constitutes a sentiment. In discussing the subject of sensual excitement, we spoke of sensations and perceptions as being performed by the senses alone; but it is necessary to notice, that although the sensual action is the radical and principal part, yet the sensorial is also essential to their completion. It thus appears, that our sentiments and ideas are partial repetitions of our sensations and perceptions—repetitions of the sensorial parts, without the concurrence of the sensual which originally produced them. I deem it unnecessary to detail the facts, and the reasoning, which establish the correctness of these positions and arrangements: their propriety is too obvious to require it.

In contemplating our perceptions, and their corresponding ideas, by the method of consciousness, we are able to discover, that they are substantially the same actions, there being no essential difference between them. At the same time we perceive, that they differ in many important circumstances. The perception is observed to be more clear, precise, and forcible, than the corresponding idea. But the greatest difference between them, consist^s in the superior stability and independence of the perception; which induces us to confound it with its cause, or to regard it as something external. We are conscious, that our ideas are creatures of our own, almost entirely internal, or dependent on ourselves alone. Our perceptions on the contrary, appear to be nearly independent of us, and are obviously the architypes of our ideas; and we therefore regard them as things external; or mistake them for the regular, fixed, external causes by which they are produced, and of whose existence we are certified alone by an inference founded on causation. We know that the idea is internal and dependent; because we can carry it about, and control it as we please: and we naturally consider the perception as an external existence; because it can neither be controuled, nor moved from a certain position, by the power of the percipient being.

A SIMILAR difference exists between our perceptions and sensations. The former generally vanish instantaneously on the removal of their cause: the latter continue much longer and thus convince us, that they are mere affections of the organ in which they occur. Colors were long supposed to have an external existence. They are now universally acknowledged to be, merely actions of the organ; and are for this reason improperly called sensations. They are in reality no more the creatures of the retina, than the whole of the perceptions in which they occur.

THESE imposing circumstantial differences, between our perceptions and ideas, are the source of the common delusion, respecting the difference between the properties of matter, and the attributes of mind. Our knowledge of the former is erroneously viewed, as consisting in perceptions only; and our consciousness of the latter, as consisting in sentiments and ideas only—and the *circumstantial* differences between them, are then mistaken for essential.

As all our ideas are derived originally from the perceptions of the senses, it is obvious, that if any sense be originally wanting, the mind can never acquire the sentiments or ideas, which that sense is designed by nature to introduce. But if any organ is destroyed, after the sensorium has learnt to repeat its peculiar actions, such a disaster cannot disfurnish the mind of its knowledge acquired through that avenue. Any kind of ideas or sentiments, however, must become indistinct and be measurably forgotten, when they cease to be refreshed by sensual impressions. In the scenery of Homer and Milton, there is a dazzling profusion of light, which their taste must have induced them to mollify, had not their recollections on this subject, been obscured by a long intermission of occular excitement.

The action of an organ of sense, almost invariably produces the corresponding action of the sensorium; but conversely, an idea or sentiment in the sensory, never revives the sensual excitement from which it originally sprung.

CHAPTER VII.

UNITY OF EXCITEMENT, AND THE COMMON STIMULANTS OF LIFE.

THE nature of excitability and stimulation; the varieties of excitement, their sources, and their laws; we have already attempted to explain and demonstrate. We shall now proceed to discuss, that reciprocal influence and dependence of our actions on each other, which we have termed unity of excitement.

EACH organ possesses a particular kind of excitable structure, adapted to the influence of a specific stimulus, and the production of a peculiar species of excitement, corresponding to the tenor of its function; yet it is by no means independent of other parts, with which it is anatomically connected. The influence of a general sympathy, in the preservation and repair of the excitable structure; the dependence of muscular excitement on the nervous system, and its derivation from the sensorium, and of sensorial excitement from the senses; have been noticed and established as principles of our nature. But there is yet a more extensive and reciprocal dependence of the different organs on each other in the article of excitement, producing that unity which is now to be explained.

A DOCTRINE under this title is already familiar to the medical philosophers: it forms a principal feature of the Brunonian theory of life. The celebrated physician, who was the author of that theory, and the most successful innovator in medical science, considered excitability as possessing the same properties in every part of the body, and as being similarly affected in all its extent by every local and specific impression. An opinion more plainly contradicted by sense and reason, has perhaps never been entertained in any other science, if we except the holy mysteries in some systems of theology. The excitable structure, though not an unit in its nature, is one continuous fabric in the human body. All the subordinate parts of the system, are connected together by continuity of substance; and nearly every portion of organised matter, is possessed of an excitable property in some form or degree; of sensibility as an organ of feeling, or contractility as a muscular fibre. But the nervous system is the principal medium of connexion in the fabric of excitable structure. The brain is the great emporium of excitability, and the central connective point in our complicated motions. By its nervous connexions with every minute fibre, a continuity of structure the most excitable is formed between the remotest parts of the body. When a process of excitement is induced in any part of this fabric, it has a tendency to spread through its whole extent: and the mutual support and invigoration, which contemporary actions impart to each other in consequence of this tendency, constitutes the unity of excitement.

WHEN a point on the surface of the body, is hurt by any kind of violence, the effects which result are not confined to the fibres directly injured, but are diffused through the adjoining substance, to an extent proportionate to the degree of violence inflicted. In such cases the fundamental structure is disorganised. The diffusion of a simple process of excitement, is not so obvious and certain; but its tendency to spread in every direction is demonstrable by experiment.

PLACE an inch square of blue paper on a black hat, view it steadily for some time, and then closing your eyes, you will perceive that its spectrum corresponds precisely to its proper size, and does not spread on the adjacent parts of the retina; but that it has a propensity to spread, which becomes efficient in favorable circumstances, is demonstrated by the following experiment. Place the same piece of blue paper on two inches square of yellow, and having viewed them steadily a few minutes, you will perceive on closing your eyes, that the internal spectrum corresponding to the blue paper, is a brilliant yellow; and that the exterior spectrum corresponding to the yellow paper, is a brilliant blue. These are the opposites, or the reverse spectra, of the colors employed; and their uncommon brilliancy proceeds from a reciprocal extension of the original modes of excitement; the internal spectrum being a more vivid yellow, in consequence of that color having just been excited in the surrounding parts; and the external spectrum being a more vivid blue, on account of that color having just been excited in the central part. This reciprocal diffusion of the processes primarily excited, is sufficient to change entirely the color of the subsequent spectra. Thus when an inch square of pink, is viewed on two inches square of blue paper, the internal spectrum becomes blue, and the external red. Had these papers been viewed separately, the spectrum of the red, according to former experiments, would have been green; and that of the blue, would have been yellow: but in this experiment, the reciprocal extension, of the actions primarily excited, into the adjacent active parts of the retina prevents these natural effects in those parts, and renders the spectra red and blue, corresponding to the colors employed. Dr. R. Darwin attributes these effects to the admission of extraneous light, and relates an experiment to prove this opinion: but we have no reason to suppose, that the humors of the eye perform their office of refraction so slovenly, as to scatter rays from every pencil over the whole retina; and in the experiment adduced, the effect referred to extraneous light, evidently proceeded from circumstances not observed by the experimenter. There is therefore a tendency in visual excitement to spread in every direction, which tendency becomes efficient in favorable circumstances.

But although excitement has only a propensity to spread indefinitely through the excitable structure; yet there are certain directions in which, according to the laws of organisation, every process is invariably progressive. Every action excited in an organ of sense, naturally proceeds along its nerve to the central parts, and is there reiterated in an appropriate portion of the common sensory. And as there is no fibre in the body, which does not possess some degree of sensibility; so there is consequently no part in which an action can be commenced, that will not, if unobstructed, proceed with celerity to the sensorium. When the nerve leading from any organ is dissected or bound, so as to prevent the passage of the extending action, all the perceptions and sensations naturally derived from that source, are effectually excluded from the mind. Thus when we compress the crural nerve in sitting, we cannot perceive any impression made on the sensibility of that limb.

Again, the energetic excitement of the common sensory itself, is naturally progressive along the nerves into the muscular system. When the nerve which is distributed to any muscle is cut asunder, and the end leading to the muscle is stimulated, the action produced descends instantaneously to the muscle, and manifests itself by a strong muscular contraction. When the spinal marrow in like manner is irritated, the muscles supplied by nerves originating below the site of the irritation. are thrown into violent action: and when the brain itself is excited by much violence, the whole system is thrown into convulsions. The ordinary degrees of action in the sensorium, produced by the derivation of common sensual excitement, do not possess this diffusive power in so great a degree. The stimulation must be violent, or the muscles morbidly excitable, before the sensorial action will descend into the muscular system. In an infant, whose whole frame is peculiarly excitable, such a diffusion is readily produced: any strong stimulus in its stomach or intestines, will cause excitement so energetic, as to be reflected from the sensory into the muscles, producing a fit of convulsion.

The current of excitement is wisely confined to these particular channels, leading from the senses to the sensory, and thence into the muscular system; its propensity to diffuse indiscriminately through the excitable structure, being naturally restricted by the principles of organisation itself. This restriction can only be surmounted in two ways; by the co-operation of a stimulus, or an established association. The excitement of the eye and occular department of the brain, cannot pass the auditory precincts, by its own power of diffusion, and excite the idea of a sound; but if its diffusive tendency be aided by an ærial vibration acting on the tynpanum; or if the visual idea has been previously associated with an auditory action; then will the excitement of the auditory department be produced, with a degree of energy corresponding to the combined powers of the stimulus, or the association, and the diffusive propensity in the visual excitement. The vibration in the air, which could not alone excite the auditory nerve, may consequently produce this effect, when aided by the excitement of the other senses, and their sensorial departments; as the action of one part of the retina is strengthened by that of another.

The mutual invigoration of excitement in all the organs of the system, by this propensity to diffusion, is obvious in the daily occurrences of stimulation. The introduction of a stimulating substance into the stomach, the direct effects of which cannot possibly exceed the limits of that organ, and the corresponding department of the brain, will give additional tone to all our exertions: the sound of a drum gives energy to the action of every fibre in a rustic: the intense pain of the gout, communicates preternatural vivacity and force to the conceptions of the mind: and when we dose over the midnight volume, the simple addition of stimulus produced by snuffing the candle, imparts a sensible impulse to all our faculties. This diffusive tendency in excitement, may be referred with propriety to the operation of that universal sympathy, which pervades every part of an organised body; and might therefore be termed sympathy of excitement.

The subject we are discussing, may be illustrated by an apparatus of combustible substances. Let a train of gunpowder be laid on the floor, and ramified into various branches, representing the nervous system; and let each branch terminate in some combustible material, as cotton, alkohol, tinder, spunk; which may represent the muscles and organs of sense: the oxygen in the surrounding atmosphere, will represent the common stimulants which daily excite us. The whole apparatus may be compared to the human system, slumbering on a downy bed at sunrise. The vital air in contact with the combustibles does not inflame them; neither does the ordinary stimulants, in contact with the slumbering system, produce the customary excitement. But if the flame of a candle be applied to the portion of tinder, it burns and kindles its train of powder; the combustion runs rapidly along the train to the central part, and is thence quickly communicated along the other trains to all the combustible materials; and thus the whole apparatus is instantly in flames: so if the window curtain be raised, that a sunbeam may penetrate the eyelids of the sleeper, his retina is excited; the action runs speedily up the optic nerve. rouses the whole sensorium, and is thence reflected by sympathy and association to every organ in the whole system; the ear apprehends the vibrations, that were previously ineffective; the touch recognises the impressions of the bedding; the locomotive muscles remove the cover, erect the body, and the man steps forward in the full blaze of excitement. In the inflammation of the combustible materials, the presence of oxygen air is unnecessary to the explosion of the gunpowder; the presence of a stimulus is also unnecessary to the propagation of excitement through the nervous system: but if you exclude the air from any other combustible, as the alkohol, the flame cannot be communicated to it; so if you exclude the stimulus proper to any organ of sense, or obstruct the association of a muscle, the excitement will not extend to them. In the apparatus, each material burns in a manner peculiar to itself, and requires a certain time for its decomposition: so in the human body, the action of each organ is peculiar to itself, from whatever source it may be derived, and requires a specific time for the subversion of its excitable structure. The greater the number of substances inflamed, the more heat will they evolve, and the stronger will be the current of air, and thus will the combustion be accelerated : so the greater the number of organs excited, the more powerful is their mutual invigoration by the unity of their excitement.

The invigoration reciprocally imparted to one another by concurrent actions, depends very much for its extent on their intrinsic congeniality. The processes in different organs, which possess common or similar qualities, are more enforced by a concurrence, than those which are less congenial in their properties. This is peculiarly true of the actions, performed by the sense of feeling in the various parts of the system. The muscular motions and perceptions, seem to be adapted nearly in an equal degree, to interchange a corroborative influence with their contemporaries. In our sensations on the contrary, we may be conscious, that there is a predilection in some, and a repugnancy in others, to an invigorating concurrence with other portions of excitement. Pleasurable sensations in general, promote each other with more efficiency, and contribute more to the general energy of excitement, than those which are disagreeable and painful. A series of melancholic and distressing sentiments, has very evidently the effect of depressing activity and vigor. The actions which are healthy and natural, and which have usually concurred in the common transactions of life, possess more invigorating congeniality, than those which are morbid, irregular, and uncommon.

Having thus investigated the unity of excitement, we may proceed to a general review of the external agents which support the diurnal rotine of human actions.

THERE is no stimulus customarily applied to the system, which produces a more copious stream of excitement than light. The eye is the inlet of nearly all the perceptions and ideas, which occupy the daily attention of the mind; and light is the agent that primarily excites them. The largeness of the optic nerve, indicates the energy and abundance of the action, which this organ is intended to perform: and the slightest attention to the transient operations of the mind, either in active life, or in the closet, is sufficient to shew, how deeply intellectual excitement is tinged with the properties of visibility.

THE influence of occular stimulation on the tone of general excitement, is apparent on many occasions. The man of strong nerves, in whom strength and mobility of fibre are happily attempered; and whose intrinsic energy is able to maintain the tenor of equable excitement in all circumstances, uninfluenced by the casual vicissitudes of stimulation; is not calculated to appreciate the effects of any stimulating agent. He does not experimentally feel his dependence for life, and health, and activity, on the objects around him. But the unhappy invalid, or delicate person, whose nerves are weak and excitable, constantly depends on the mercy of the elements for his tranquility and enjoyment. To day he is wretched and depressed; to-morrow he is happy and elevated; according to the fluctuations of external nature. He therefore learns by experience the great efficacy of light in the excitement of the human system.

SOME years ago I resided one summer in a southern climate, in which I suffered considerably from intermitting and bilious fevers: an atonic debilitated state of the nervous system, continued for a year after my return to a northern latitude. During this period, a dark cloudy day invariably produced a considerable degree of lassitude and melancholy, in consequence of the abstraction of light. The accompanying chilliness and moisture of the air aggravated these effects, but were not their principal cause: for when the sun darted a few invigorating beams through a vacancy in the clouds, the langour and depression were removed, before the state of the atmosphere could be changed.

Caloric is an agent, similar in some of its physical properties to light; but it is not, like the latter, adapted to stimulate any particular organ of sense, or to produce any correct perceptions of external things. It is however a source of considerable excitement. It acts on the sense of feeling in every part of the body, but particularly on the external surface. An ordinary quantity of it, while it continues stationary, seems to produce no effect: its motion only, or a change in its quantity, is stimulant; and according to the manner of that change, it produces different kinds of sensation. Its influx, or accumulation in the body, excites the sensation of heat; and its efflux or abstraction, the sensation of cold. It also acts in a slight degree as a stimulant to the muscular fibre. Variations of temperature are indeed rarely great enough, in any but superficial parts, to become stimulant; but when the heart or intestines are exposed, the application of any thing very hot or cold will excite their contractions; and the rapid reduction of temperature on the surface, excites convulsive motions in the large muscles, as we observe in the tremors produced by sudden exposure to great cold.

It is highly important, that the temperature of vital matter should be kept nearly uniform; and nature has employed a variety of means to effect this purpose in man; it is hence not improbable, that the stimulating power of its variations, is chiefly designed to subserve the same end, by admonishing us of the impending danger. And as these variations are incessantly occurring, they contribute at the same time to support the general fund of excitement.

The modern theories of animal life, consider caloric as a positive stimulus like sound and light, and as constantly producing action, proportionate to the quantity present in the organ. But this opinion is erroneous. It is not the presence of caloric, but the change of its quantity, its influx or efflux, which excites us; and in either case, unless the change be very great or sudden, it only produces sensation. This at least is the only effect, that can be discovered with certainty, by either sense or consciousness, or that can plausibly be inferred by reason. The most frequent and sudden changes of temperature in the human body, consist in the production of cold; for nature abounds in substances below the vital temperature, with which we must incessantly come in contact. The reduction is again repaired, by the internal resources of the animal economy, too slowly to produce excitement, Hence the production of cold, which is generally accounted the abstraction of a stimulus, is in reality the principal mode in which caloric becomes stimulating. It should be remembered, that a change in the physical influence, exerted on the organisation of the system by external agents, constitutes the very essence of a stimulus; and therefore, that the abstraction of a customary influence, produces excitement as certainly as its increase, or as the application of a new agent.

The abstraction of caloric, does not produce general debility, and ultimately death, because it is the removal of one stimulant among a multitude, which is untrue; but because it radically disorganises the system, so as to render it inexcitable. The annals of justice, of persecution, and of accident assure us, that an *excess* of this element, is equally destructive to human life, by its disorganising power.

Sound, or vibrations in the air, constitute an agent, which is very efficient in impelling the diurnal rotine of action. As soon as we rise from slumber, our ears are hailed by a variety of sounds, which are incessantly reiterated until they are silenced by the return of night, or finally excluded again by sleep. They proceed from a variety of natural and artificial sources. All the revolutions in the three kingdoms of nature, produce commotions in the atmosphere in which they are transacted. The currents of air, of water, and of electricity; the fall of rain, the growth and destruction of vegetables; the unceasing buz of the insect tribe; the clamors of discord and of joy in domestic animals; the human voice, and the din of mechanic labors; produce an incessant and strong stimulation of the ear. Among this variety, those sounds only which are strange or loud, or in some manner interesting, attract the attention of the hearer; yet they are all productive of action, and tend by the unity of excitement to rouse all the energies of the system and support its activity.

Because an impression on an organ of sense, is not followed by a complete sensation or perception, we must not infer that it produces no excitement. Muscular motion itself is naturally accompanied by sensation; but by habit this collateral effect ceases to be noticed: thus the actions of the heart and intestines, and frequently of the locomotive muscles, proceed without being recognised by the mind. In a variety of instances, which cannot be detailed and explained in this place, the impressions on the senses which pass unnoticed, manifest their efficiency by producing, through association, various sentiments, ideas, and muscular actions, which become the objects of attention. In our common locomotions, in the practice of the mechanic arts, and in the employment of language, the greater part indeed of our actions and thoughts, proceed by association, from sensual motions which pass unobserved. In fact, the power of attention, as will be shewn when we come to discuss that subject, can embrace only a small sphere of excitement; and it would be absurd to say, that what is left without its precincts, is necessarily suppressed: we might as reasonably affirm, that when we shut our eyes, we annihilate the whole visible world.

A TRAIN of sounds, possessing an agreeable body, and varied in tone according to certain rules founded on the laws of sensual excitement, produce strong and delicious sentiments, and invigorate in an eminent degree all the movements of the system. But music can scarcely be called a common stimulus of life.

WE are constantly exposed, whether sleeping or waking, to mechanical stimulations of the organs of touch and of feeling, which materially contribute by unity and association to the general quantum of exertion. The gravitation of our bodies to the earth, by which they are at all times forcibly pressed against some solid substance; the perpetual recurrence of impulse, in the practice of the mechanic arts, and in the common movements of life; are copious sources of this kind of stimulation. But the air and our clothing, which are always in contact with the skin, exert a more constant and efficient influence on this organ of touch and feeling. The air itself has probably not much activity as a stimulus; but it is the vehicle, by which water is applied to the surface, so as to have a sedative operation. The state of the air in this respect, has consequently great influence on the spirits of delicate persons: and the impressions of their clothes are equally or more efficient. The smoothness of linen is less stimulating than the asperity of cotton, which is again less than that of flannel; and a garment that has been worn, excites less than one which is newly washed. Of these different degrees of stimulating power, I was highly sensible during my convalescence from the fevers of a southern climate. A clean cotton shirt and a smooth chin, were no contemptible acquisitions in my enjoyment of life; they were scarcely less efficient than the agency of light itself.

A VARIETY of materials, both dissolved, and floating in the air, occasionally give an impulse to the activity of the system, by stimulating the olfactory nerves. The energy and diffusive nature of the excitement originating in this organ, are displayed in the revival from a fainting fit, when effected by some strong odour, as the vapor of amnonia. From a state of collapse, approaching to an entire suspension of excitement, the system is thus restored in a few seconds to its natural degree of activity. But as the odours commonly present in the atmosphere are faint, we cannot suppose that they add much to the strength of our common excitement.

IN the interior of the body, we find a multiplicity of materials, which are stimulant to the parts containing them. They consist of our food, blood, and secretions. Alimentary matters produce their first effects on the organ of taste. Their stimulating power in this stage of their application, is very considerable; a bite of tasteful food, or a mouthful of stimulating liquor, imparts a sensible degree of refreshment, before it leaves the palate. But the stomach is the organ, in which the aliment produces its principal stimulation. It acts in some measure by its mechanical distension, but chiefly by its chemical qualities. When it distends the stomach too much, instead of causing excitement, it frequently arrests that process by compression, and causes a temporary stupidity of mind, as we often experience after a full meal. It produces excitement of two kinds, muscular contraction and sensation; but the latter is the principal. As the eye is the organ, through which we receive most of our important perceptions; so the stomach is the principal source of strong and efficient sensation. In this respect it seems to merit precedence of the power of feeling in the skin itself. Yet its excitement, either as a muscle, or an organ of sense, does not attract much attention. There is perhaps no moment in our waking hours, in which we cannot by attention become conscious of considerable sensation, about the site of the stomach, or in the precordia; yet our apprehension of its amount, is rarely equivolent to its real quantity, and its power in supporting and modifying the general excitement. Our general feelings, or in common language spirits, depend chiefly on the state of action in this organ. The personal history of a dyspeptic, or hypochondriac person, would shew us how much the energy and enjoyment of life depends on its sensual excitement. A beautiful picture, a pleasant story, a piece of good news or of good fortune, occasionally invigorate our pleasurable sentiments, in which the enjoyment of life consists; but the excitement of the stomach, is the fountain from which we derive the permanent tenor of our feelings, and the predominant traits of our character.

The blood and secretions in the various parts which contain them, effect excitement principally by the stimulus of distension. The blood, by stretching the fibres of the heart and arteries, excites them to contract and drive it forwards in the course of the circulation; and this effect may at the same time be accelerated by its chemical properties. Nor is it improbable, that the circulating blood and secretions in all parts of the body, considerably stimulate the sensibility they possess, and thus augment the general quantity of vital action.

CHAPTER VIII.

CONCERNING ASSOCIATION.

In the preceding chapters, we have been employed in the discussion of vital topics, which we have kept measurably separate from one another in conducting their investigation. Our next labor is to examine more particularly their natural and artificial connexions.

We have seen, that in the complex fabric of a human being, various kinds of excitement are necessary to subserve the details of its economy ; we have marked the characteristics and principles of these varieties, as far as curiosity or usefulness seems to require ; and in the last chapter, we ascertained, that the production of one kind, communicates alacrity and force to the others by unity of excitement. We now intend to develope a principle, which artificially connects these scattered portions of excitement ; harmonises our exertions in the daily transactions of life ; and constructs the grand fabric of our character and acquirements. The organs of the human body, if they were not combined by continuity of substance and nervous connexions, would form an impotent and perishable mass of materials: so the actions they perform would be idle and destructive, were they not combined and harmonised by unity of excitement and ASSOCIATION.

In common language, the term association signifies an assemblage, or convention of things, which are naturally distinct. In rendering it technical in the science of human nature, we adhere to this literal meaning, and express by it, a connexion between different portions of excitement, which has been artificially established. It would be deemed absurd to say, that cause and effect, or color and extension, are associated together; for they are inseparably combined by nature: in the language of physiology it is also incorrect to say, that the action of an organ of sense, and of its corresponding department in the brain, are associated; for the latter is the natural effect of the former. Again, that conjuction of things, which is merely accidental and transitory, is not embraced by this term in its common usage: neither can the casual concurrence of animal motions be accounted an association.

When two actions are frequently excited in concurrence or succession, they become so connected, that the production of one only will constantly revive the other; and the connexion thus formed constitutes an association. Thus, when the figure and motion of a horse, with the noise of his neighing, are frequently presented to the senses of seeing and hearing at the same time, the visual and auditory actions produced, become so connected, that when the neighing is afterwards heard, it immediately recals the absent idea of that animal. Admonished by the experience of injury, we soon learn in our infancy to shut the eye, when exposed to violence from the impulse of any thing contiguous; and having constantly repeated this act, when any thing not under our control approaches the eye, the action of the orbicularis muscle that shuts it, becomes excitable by that action of the retina, which constitutes the perception of an approaching object; so that whenever this perception occurs, the eye is irresistibly closed, though we should will the contrary.

IN these examples of associated motions, it is evident, that there must be an intermediate train of excitement, between the links of the association which are obvious to the senses; between the perception of sound by the auditory nerve, and the idea of a horse which it revives; and between the perception of an approaching body by the retina, and the consequent contraction of the orbicularis. The first action, which is the cause, cannot possibly produce its effect, without exerting an influence, through some medium, on the part in which that effect must occur. The retina and the muscle are connected in a direct line, by their continuity of substance with the intervening parts; and they are connected in a more circuitous route, by the optic and fifth pair of nerves. But unless this material connexion be the medium, through which something is communicated from one part to the other, it might as well not exist; for it cannot in any other way contribute to the production of the effect: and if no connexion existed, an impression on my retina could not induce the closure of my eye; it might as readily close the eyelids of a Chinese mandarin. It is frivolous to suppose, that any influence can be communicated through this nervous medium, which does not consist in a train of action, commencing in one organ and terminating in the other.

The action in the retina, which is excited by the approaching object, must proceed up the optic nerve to the brain, and thence descend along the fifth pair and its maxillary branch to the muscle of the eye, in which it manifests itself by a muscular contraction. We shall now at tempt to explain the establishment of this train of excitement, which forms the association.

When any organ of sense is stimulated, its action runs with celerity and certitude along its nerve, to the corresponding department of the brain, in which it is repeated with amplitude and precision, constituting a sensation or perception. This is a radical condition, instituted by nature, in the organic structure of the nervous system. The same omnipotent legislator, has given the whole excitable structure, a propensity to participate in the activity of its subordinate parts, when excited by direct stimulation; and this propensity produces the unity of excitement. When therefore the image of a horse is penciled on the retina, by the optic powers of the eye, and his neighing vibrates on the ear, the consequent actions of these organs, are simultaneously transmitted to the auditory and visual departments, which they rouse to the activity of perception. These departments, acting with vigor and attention at the same instant, infuse their activity into the intermediate connecting portion of the brain, by unity of excitement, or the peculiar properties of its organisation. The action of this intermediate part, derived thus equally from the communication of auditory and visual excitement, must possess an intermediate nature between them; as the color produced by an equal tendency to the perception of yellow, and of blue, is the intermediate green. By frequent simultaneous repetitions, all these actions acquire a facility of reproduction in an equal degree, according to the universal law of excitement we formerly developed. Consequently, when the auditory portion of this train is revived by the impression on the tympanum, the action will be communicated, as in other cases, along the auditory nerve to the appropriate department of the brain; and the intermediate part, leading to the seat of visual ideas, having acquired a great facility of performing its portion of the train, will now be excited into action by the auditory motion alone; and when excited, it will easily infuse its activity into the visual department itself, to which, in the present case, it bears as much affinity, as to the auditory whence its action is derived; and thus the visual idea is recalled by the sound, with which it originally concurred.

We may suppose, that there is a common intermediate portion of brain, connecting the departments corresponding to the different senses, which receives motion indifferently from all the sources of sensual excitement, and performs the intermediate common link, between the extremes in every train of association. This portion is equally adapted, in the example we have adduced, to receive and reiterate the actions of the eye and ear; and when these actions concur, it consequently receives an intermediate motion, equally adapted to revive, or be revived by either kind. When the whole train has been repeatedly excited at the same time, so as to acquire an equal facility of reproduction, the excitement must consequently run as readily through this intermediate portion, as along the intervening nerve, from the organ of sense to its corresponding sensorial department.

ASSOCIATION is thus nothing more, than a modified, or an artificial, unity of excitement; a channel traced by repeated stimulation, in which the current of excitement may glide through the sensory, from one organ of sense or motion to another.

FROM this view of its nature, it appears, that the power of association is not an ultimate principle, but may be analysed into others, more fundamental in the operations of the excitable structure. It evidently proceeds from the diffusive propensity, and facility of repetition, which belong to excitement. When any action is excited in one organ, it has a tendency to run into others, and incite them to activity: but this tendency is insufficient to produce an actual exertion, unless an action in some organ has previously concurred with the present, so as to facilitate its performance on this occasion. And whenever the diffusive propensity, is aided in this manner by the facility of repetition, it becomes efficient, and constitutes the principle of association.

The establishment of an association, is hence quite a simple and natural event. Every action that can be produced in any part, tends by unity of excitement to the sensory, and to the production of general activity. When two motions are simultaneously excited with energy, they are thus naturally transmitted to the sensorium, where they interfere with each other in its central part, forming an intermediate train of action between the stimulated organs; and this train acquires such facility by repetition, that the renewal of one extreme will afterwards revive, with some exceptions, the whole series.

The intermediate train of action, generally runs through the sensorium, but perhaps not universally. When sensual or sensorial actions, derived from different sources, become associated together, the common sensory is the only medium, through which their union can possibly be effected. The same medium is commonly as indispensible, in that extensive class of associate motions, which is formed by the connexion of muscular contractions, with ideas and effective impressions on the organs of sense. Thus the train which connects the excitement of the orbicularis, with a certain kind of visual perception, passes in its course through the interior of the brain: and the actions of the muscles moving the eyeball, which have become associated with certain motions of the retina, are derived through a channel which runs a similar sensorial circuit.

In many instances however, the nerves which are distributed to different muscles and sensitive fibres, unite before they arrive at the common sensory; and in these cases, associations may be formed independent of that part. The nerves and muscles on which the movements of the hand are dependent, afford various examples. The flexor muscles of the fingers, have been so frequently subjected to synchronous action in shutting the hand, that their motions have become strongly associated; and in consequence of the union of their nerves, it is obvious, that this association may operate without the assistance of the brain. If the common trunk of their nerves were dissected, and one of them were locally stimulated with much violence, it can scarcely be doubted, that its action would be communicated to the others, through the remaining portion of their common nerve.

The sense of feeling, in every part of the body, being connected by an union of nerves with the contiguous muscles, a variety of sensations and muscular motions may also be associated independent of the sensory. Thus the action of the digital flexors, in holding any heavy substance in the hand, is supported by an association with the excitement, which that substance produces in the senses of touch and feeling. A case occurred to Dr. S. Brown in this country, in which the sensibility of the hand was destroyed, whilst the contractility of its muscles remained. The lady to whom it happened, could hold any thing in her hand by a voluntary exertion; but as soon as her attention was occupied by another object, her fingers would relax, and drop what they held; because, during the suspension of the voluntary effort thus produced, the action of the muscles was not maintained by association as in common cases, the impressions of the object on the paralytic senses of the hand being inefficient. The intermediate train of action in this example, originally extends to the sensorium, for it is formed by the agency of volition ; but it is afterwards probably contracted, or at least might be contracted, to a shorter circuit, extending only to the union of the nerves concerned.

THESE cases, in which the actions of different muscles are associated with each other, or with sensations excited in contiguous parts, whose nerves are branches from a common trunk leading to the sensorium, are the only instances in which the connecting train of motion must not pass through the common sensory ; and they are but few, when compared with the multiplicity of associations, which occur in the human system. The innumerable muscular actions in common locomotion, and in the practice of the mechanic arts, are nearly all derived from visual perceptions and ideas, by trains of association, which necessarily pass through the interior of the brain.

THE celerity and power, which an association may attain, are surprisingly great. The associate motion appears to occur instantaneously, on the production of the action, with which it has been associated. Quicker than reflection can operate, the perception of an approaching object by the retina, produces by association, the contraction of the orbicularis and closure of the eyelids. Nor is the strength of the contraction, inferior to the celerity of its production. When we spring in affright from the sudden approach of injury, the locomotive muscles exert their utmost force. The articulate sound, or the written character of a word, suggests the associated idea, with a degree of promptitude, which eludes the power of attention; and with a force, which nothing we can oppose will counterbalance or pervert. The man of learning and science, who has associated his ideas with different words, and moulded his thoughts in various idioms; and who has fortified his faculties, by frequently analysing and comparing his conceptions; may be able to dissever the strong connexion of words and ideas; but the task is too hard, for the undisciplined boy, and the unlettered adult. They not only think in general, through the instrumentality of words, but are unable by any effort, to stay the association, and suspend their use.

Actions which have been early, and invariably conjoined, and often repeated, become so strongly associated, that their disunion is even impossible. Thus, the association of our ideas of distance, magnitude, and figure, with certain shades of light and darkness, excited in the retina, and certain motions in the muscles, which act upon the globe of the eye; has been so early established, and incessantly reiterated every day of our lives, that the occurrence of the latter, instantaneously revives the former with such power, that they seem to us co-essential parts of the same perception. And thus the idea of every geometrical figure, is tinged with some sensual property, corresponding to the source of its introduction; with color and visibility, when introduced by the eye, and with solidity when derived from the sense of touch; and from these sensual stains it is impossible to absolve it. So the muscular actions, which move the little and ring fingers, have so often and regularly concurred, that on a first attempt, no effort can dissever their association. Yet the force of this mode of excitement, is generally much inferior to that of physical stimulation. Thus, an idea can never be excited by a word, with such strength and vivacity, that it shall be mistaken for the perception of its object.

Associations may not only be rendered quick and strong; they may also be rendered durable. When firmly instituted in early life, they only cease with the vitality of the parts which perform them.

The circumstances which give quickness, and force, and durability to associate motions; are energy of stimulation, frequency of unmixed repetition. and the earliness of the period at which they are established. When any individual portion of action, has been forcibly excited, it may afterwards be repeated with more facility, than if it had originally been produced in a languid and imperfect manner: so a train of association, that is performed with energy in the first instance, will be established with equivolent firmness, and may again be revived with proportionate facility. Thus, when we undertake to associate a series of ideas in the mind, as in learning a speech or a song, we are successful in proportion to the attention and interest they excite, or the energy with which we concieve them. When the first review is insufficient to connect them in the memory—to render the subsequent items excitable by those which precede them; we undertake by repetition to compensate the insufficiency, and our labor is constantly attended with success. But if the repetition be occasionally interrupted; if extraneous ideas be forcibly thrust into the mind, so as to break the continuity of its attention, and arrest the current of the train, which it desires to establish; the effect will be enfeebled, and a greater number of repetitions will become necessary. So in learning any mechanic art, the first attempts are commonly crude and abortive: by attention and perseverance; by the frequent repetition of our trials; the muscles to be employed, acquire the necessary associations with each other, and with the ideas and perceptions of the mind; and thus the tyro is transformed into the experienced artist, who performs the peculiar motions of his handicraft, with facility, force, and precision.

THE more early in life, we establish any of these associations, the more complete is our success. Infancy is the peculiar season of association. Whatever it may attempt to learn, if dependent wholly on this principle, and consonant to the structure of its system, is accomplished with ease, and acquired in perfection; nor is it afterwards readily subverted or forgotten. But when the adult, or the aged, apply themselves to the acquisition of any new art or science, they find their muscles obstinate, and their ideas unmanageable: the necessary associations are instituted with difficulty, and forgotten with ease. To this general truth we frequently meet with a seeming exception. A gentleman of sixty, who has spent a laborious life in the practice of an art, or in the study of a science, will acquire any additional knowledge concerning it, with more speed and accuracy, than the novice of fifteen will gain a portion of the elements, which seems to be equivalent. In this case, the proficient is previously familiar with all the items in the part to be acquired, and has already associated so many, that the few additional links to be formed, are trivial, when compared to the continued chain of association, which the youth must elaborate, from materials which his mind is yet unpractised to concieve, and his hand to perform. When they apply to any thing equally new to both, the superior speed and permanency of youthful acquisition, are universally conspicuous.

In youth the excitable structure of the system, possesses extraordinary mobility. The common stimulants of life, which produce in the adult and the aged, a moderate and equable degree of excitement, impel the infant fibre into that high grade of exertion, which naturally promotes the establishment of associations. In early life, their establishment is also facilitated, by the absence of contravening habits. In the infant, every portion of excitement is insulated, and independent of its contemporaries. The actions of all the organs are produced in lawless confusion: consequently the fetters of union and system may be easily imposed. In the adult, on the contrary, every possible action is already connected with others, by numerous associations, which are fortified by the practice of years. Every movement is effectually subjected to the laws, which regulate and harmonise the general transactions of the system. To enlarge; to modify, or subvert this ancient discipline, by forming new associations, must naturally be laborious and painful. Consequently the habits of motion, which are instituted in early life by energetic stimulation, and frequently repeated without alloy, must attain the highest degrees of power and permanency.

THE practicability of association extends to every article of excitement. All the varieties of muscular, sensual, and sensorial action, from one extremity of the system to the other, may be connected to one another by the agency of this principle. It is subject however to some natural restrictions in its operation. The sensual actions in general, are not completely under its influence. They may be connected by trains of association with other portions of excitement : but the progress of the train, must invariably lead from the organ of sense. It cannot possibly be reversed, so as to revive the sensual action without the aid of a stimulus. The practicability of association, is also very limited, in the muscular motions of the arterial system and the intestinal canal. They have always some confined associations among themselves ; but can rarely be efficiently connected with other portions of excitement.

THE various effects of this principle, afford the only foundation, which can be assigned for Darwin's fanciful and indefinite notions, concerning his four sensorial faculties. When a sensation promotes activity by unity of excitement, or produces sensorial or muscular motions by association, it forms his faculty of sensation. The nature of volition, which equally depends on this principle, will be explained in a subsequent chapter.

ASSOCIATE motions may be divided, according to the manner of their production, into two classes, which I shall denominate, COLLATERAL and CONSECUTIVE ASSOCI-

ATIONS. When the associated actions are cotemporary, or simultaneously performed, their association is collateral: and when one of them precedes the other in time, their association is consecutive.

COLLATERAL associations are formed, when the motions concerned are conjunctly excited in the first instance; and when their subsequent concurrence is necessary to effect the object of their connexion. All the varieties of excitement, are susceptible of this mode of union; but it most frequently occurs in actions, that are similar in their nature. Thus, the contractions of the locomotive muscles, are extensively combined in this manner. There is not a single movement, or attitude of the body; not a mechanical motion of the most insignificant part; which can be effected without the co-operation of various muscles, frequently the majority of all those attached to the skeleton. To these synchronous exertions, however, they are not so often excited by their collateral association with each other, as by their consecutive association, with some preceding conception of the mind, or moiety of sensual excitement. Thus, when I involuntarily spring from an impending injury, the synchronous action of my muscles, is produced by their respective associations with my perception of the danger, and of the circumstances of my situation. Various other collateral associations of this description, are formed of the ideas which have been derived from a common source. For instance, every time we open our eyes, an extensive range of congenial perceptions are simultaneously excited, and thus become collaterally associated, so that the recurrence of a part in their corresponding ideas, will afterwards revive the whole tribe.

PERCEPTIONS, ideas, sentiments, and muscular motions, performed by different organs, are also frequently combined in one collateral association. Thus in the fabric of language, the perception of the written character of a word, the idea of its sound, the sentiment it represents, and the action of the respiratory and vocal organs employed in its enunciation, are all collaterally embraced in a common bond of union. When either the act of pronouncing the word, its articulate sound, its written character, or the conception it represents, is repeated in any form, it invariably tends to the simultaneous production of all the others.

BUT the different parts in a collateral association, do not always revive one another with equal facility and force. This appears to depend upon two causes; the customary method of introducing the tribe; and the difference of mobility in its different parts. In most cases, they both operate in producing the effect. Thus, in the collateral association of the idea of a horse, with the noise of his neighing; or the idea of my friend, with the sound of his voice; it is observable, that when the auditory part is excited, it revives with ease and certainty the visual idea; but on the contrary when the visual action precedes, the auditory does not so readily follow it: because the visual action, having been the most frequently and forcibly performed, has become the most excitable; and because in our perceptions and thoughts, we have most frequently passed from the sound to the animal that produced it. The use of language affords many similar examples. Thus, we are more familiar with the articulate sound of a word, than with its written character, which are collaterally associated in our minds; and we have more frequently passed, from the character to the sound, than in the contrary course; for we oftener converse than read; and oftener read than write: accordingly the character suggests the sound with great certainty; but is not so readily suggested by it. We are not enabled by practice, to concieve our ideas in general with more efficacy, than we commonly concieve the articulate sounds which express them; but we pass more frequently from the sound to the idea. than in the opposite direction; for we hear others speak oftener than we speak ourselves: and hence the name of an object or an idea, recals it to the mind more promptly, than the conception of the idea recals the term to express it.

THESE observations will apply to an intellectual fact, which has frequently been recorded. When the mind is debilitated by age, disease, or pressure on the brain, it suffers in a peculiar manner in the association of words with its ideas. Its perceptions and ideas cease in a great degree, to recal the terms which express them; whilst the terms on the contrary. continue promptly to suggest the ideas they signify. In this case, the imbecility produced, is sufficient to obstruct the feeble progress of action, from the principal idea to that which is its sign; but is not sufficient to affect the stronger train of action, which runs from the sign to to the seat of the conception signified.

When a sensual action is connected in a collateral association, it must either be the introductory item, or be left unexcited; for the senses can only be excited by direct stimulation. The current of action naturally tends from the organ to the sensory; nor can it ever be artificially reversed.

When two actions are excited in succession, so that the process of the first has not entirely subsided before the second commences, they become connected by consecutive association. In this case, the intermediate sensorial train, which conjoins the principal portions of excitement, is possessed of such a nature, as to be excitable only by the declining stage of the antecedent motion; it being originally produced by the concurrence of this stage, with the commencement of the secondary action.

Consecutive associations embrace every kind of excitement, and are extremely numerous in the human system. Life itself is an incessant straam of action, in which all the items, and conjunct tribes, not flowing directly from stimulation, are connected to their ateceedents and introduced, by the consecutive mode of association. Nearly all our muscular motions are excited, by their consecutive connexions with the excitement of the senses, and the conceptions of the mind.

The rotine of respiratory actions is an example, in which muscular and sensual motions are consecutively conjoined. When an act of respiration is finished, the deficiency of oxygen, that commences in the pulmonary blood, like the abstraction of caloric, excites a disagreeable sensation, which produces the associated act of inspiration; and no sooner is this finished, than the act of expiration is produced in the same manner; and thus we experience an incessant rotine of consecutive motions every minute in our lives. In this case we may observe, that the alternate muscular contractions become themselves so far connected, as to introduce each other, without a perceivable sensation intervening in the habitual performance of this function.

In learning the alphabet we form both collateral and consecutive associations. The visual perception of the letter, the articulate sound which is its name, and the various concurring and successive muscular motions by which it is uttered, are collaterally associated; and these collateral tribes corresponding to the different letters, are successively connected to each other by consecutive association. The actions of the intestinal canal; and of the auricle, ventricle, and artery, in the circulation of the blood; are consecutively associated, but not with sufficient force to proceed without the concurring stimulation of the aliment and the blood.

In all the consecutive connexions of excitement, the secondary link never introduces that which customarily precedes it. Thus, we cannot pass without a train of reflection, from one letter of the alphabet to another which stands before it, until we have associated them by frequent repetition in this retrograde order. No fact or argument has ever occurred to me, which appeared sufficient to establish the improbable theory of retrograde association. No unequivocal example has ever occurred in the human system. No individual has ever repeated the alphabet, or sung a tune, in a backward direction, when he wished to proceed in the common order. The only cases which seem to be of this description, may be shewn, by a pathological inquiry, to proceed, not from retrograde association, but from morbid and retrograde stimulation.

THE limits of collateral and consecutive associations are not very distinct. In every collateral case, the part which introduces the others, must necessarily precede them; and in consecutive examples, the antecedent link never entirely vanishes before its consequent has commenced. The interval between these extremes; between the case in which the secondary action commences near the commencement of the first, and that in which it commences near the conclusion of the first; is filled up with examples, which are gradually varied from one description of association to the other. There is however sufficient ground for the division we have made. In one class, the associate motions reciprocally introduce one another; whilst in the other class, one action is always the antecedent, and another the consequent.

BY the necessity of their structure, and the circumstances of their situation; and by the practice of the various arts to which they are voluntarily devoted; a variety of collateral and consecutive associations, are established in the human species with different degrees of power. The actions which necessity compels, or convenience requires, to be invariably conjoined and frequently repeated, become indissolubly combined. Others, which it is necessary, should only be occasionally conjoined, become associated with proportional degrees of force, sufficient to produce them in the favorable circumstances, which may demand their concurrence. The perfection of the excitable structure, and the propensity to continue in action, may render even the slightest associations effective, when there is no contravening exertion. That incessant stream of excitement, which commences, continues, and ends with the vitality of the system, embracing all the transactions of human life ; is composed of these various tribes and trains of motion, introduced, connected, and regulated by incidental stimulation.

THE present chapter may be concluded by exemplifying the principles it contains, in the process of learning, in a methodical manner, to play a tune on the piano forte.

WHEN a young lady undertakes to learn music, she first combines in collateral associations, the characters of the musical notes, with their names and pronunciation. She then adds to each tribe, the duration of its note, and the tone which its relative situation on the stave is designed to express ; and she continues her task, by connecting to these tribes, the corresponding keys of her instrument, and the motions of her fingers in pressing them. Having familiarised these collateral actions ; the perceptions of the note in the book, the tone and duration it represents, the key of the instrument which resounds it, and the act of touching that key : she is qualified to commence a tune. Her first attempt is slow and imperfect ; but by frequent repetition she acquires facility and taste. The successive notes on the stave become more easily apprehended ; and each one excites its collateral associates with greater promptitude and accuracy, particularly the associated act of pressing down the key which resounds it. The successive tribes of action, which enter into the performance, especially the auditory items. presently become connected by consecutive association; and the lady then proceeds to play without the direction of her note-book.

I HAVE thus attempted to ascertain and illustrate the general nature of association. To develope all the circumstances and varieties of its operation, would require an extensive treatise on human nature. Its more complete investigation must therefore be reserved, and prosecuted in subsequent discussions with which it is connected.

CHAPTER IX.

OF IDEAS, THEIR ASSOCIATIONS, AND ABSTRACTIONS.

As we are now commencing investigations more completely metaphysical, in which the term conception will frequently be used, it becomes necessary to inform the reader of its meaning. We intend to use it, as a general term, to express all our intellectual actions, but more particularly the ideas and sentiments of the mind. In the best systematic authors of the present age, it has a much more confined signification. As we cannot descend in this elementary treatise to their minuteness of discussion, we will not restrict ourselves in the use of this term, but continue to employ it in its literal and common acceptation.

It will also be convenient to render the meaning of the term association more comprehensive. In the preceding chapter we ascertained, that it is most commonly used to signify, the artificial connexion of actions which are naturally distinct. But the anatomical structure of man, and the nature of the terrestrial scene which he inhabits, render certain intimate combinations of his ideas altogether unavoidable; and it will not be improper to express these by the same term, designating them *natural* associations. On the contrary, the epithet artificial may be used, to distinguish those associations of ideas, which are established by the discipline of education, in learning the arts and sciences, cultivated by man through necessity or choice. Thus the color of a horse, and his visible figure, form a natural association; for we cannot acquire these ideas separately: but their connexion with his name is the product of art. The general distinction of collateral and consecutive, is also to be applied to the association of ideas.

It appears, that some difference of opinion has existed among philosophers, with respect to the nature of an idea. It is said, that the metaphysicians of antiquity, believed their ideas to be distinct existences, transmitted from the objects of nature and retained in the mind. On this subject my learning does not enable me to speak. But I feel authorised to affirm, that the same opinion is very unfairly attributed to Locke and his followers, by a later and more popular sect. The writings of that great man, who is entitled to the rank in this science, which Newton holds in mathematics and natural philosophy, are indeed not explicit on this point, because he never directly discussed it. He was a genuine experimentalist. Though his work is not a formal induction, yet the accurate observation and just reasoning which pervade it, are fully equivolent. And in this character, it was sufficient for him to mark the existence of ideas, and examine their obvious properties, without investigating their intrinsic nature, which he probably deemed an idle speculation. Notwithstanding the literal meaning of his words on many occasions, I think it must be evident to the attentive and candid reader, that he considered an idea as an intellectual something, generated in the mind by its sensitive intercourse with external nature, and by its conscious attention to its own operations; and that he never believed, that any thing distinct from the mind, was deposited in the memory by an act of sensation—No person more clearly understands and firmly believes, that his perceptions and ideas are actions of the mind, than the author of the present treatise; yet I have no doubt, that a critic might find in his style ample proofs of a contrary doctrine.

The opinion maintained in this work, concerning the nature of an idea, has already been clearly stated. We view it as nothing more, than a repetition of the sensoral action, which formed an integral part of the prior perception. We cannot prove, that the sensual part also may not sometimes be imperfectly repeated; but many facts demonstrate, that its repetition is not important.

Our ideas, considered as the representatives of external things, and the materials of human knowledge, are fundamentally defective, and inadequate to the aspiring aims of mankind. They have in general no resemblance of the objects by which they are excited. It appears to be impossible at least, that they can possess properties, which shall accurately correspond to those efficient energies of nature, which it is most important for man to know. The intrinsic motion of an organic fibre, which constitutes excitement, can never resemble the powers of external bodies which produce it, or the essential and active properties of those very elements in which it occurs. No objects in nature can be proximately more distinct and dissimilar, than a process of change in the organic mode of combination. and the elementary properties and powers on which it is dependent. Our ideas cannot therefore individually afford a perfect knowledge of their external objects.

If they could, however. possess the same *relative* properties, with respect to one another, that exist between their exciting causes, our knowledge would still be practically perfect: the ideal system would still be an adequate representation of the real state of external things. But this kind of perfection is apparently as impossible as the former. Judging abstractly, we are obliged to conclude, that the different motions excited in organic matter, cannot possibly possess the same relative powers, and operate the same effects on one another, that are possessed, and operated, by external bodies, and by the elements of the organic matter itself. And this conclusion is supported by the universal experience of mankind. The most sublime and penetrating genius, was never able to obtain such a knowledge of the common elements of nature, as would enable him to predict their effects without the aid of experience.

But there is one kind of knowledge, to which these imperfections cannot be attributed. All our mathematical ideas have properties, which perfectly resemble the properties of nature to which they correspond. Our abstract unalloyed conceptions of this kind, and the objects they represent, are in reality the same kind of existences, and possess exactly the same properties. The ideas of number, extention, figure, and motion, are really numerical, extended, figured, and motory in the mind ; or the sensorial actions, of which these abstract ideas are integral parts, are performed by portions of the brain of which these mathematical properties may be affirmed. The idea of the number three, for example, is performed by three distinct points in that organ ; the idea of a triangle consists of a triangular train of action ; in the conception of geometrical solidity, a solid portion of the brain is excited ; and in the conception of motion, the idea does actually traverse the region which conceives it. To this perfect coincidence of these ideas and their objects, we are to refer the superior perfection of the mathematical, and the physico-mathematical sciences. Our elementary conceptions in them, are thus so accurate and complete, that we are able to develope all their properties and relations, without recurring to their objects for experimental assistance. Another circumstance, tributary to this perfection, is the frequent recurrence of mathematical ideas in all the operations of the mind. Thus, number, magnitude, and time, are component parts in every sensation and perception we can experience ; geometrical solidity with all the attributes it involves, must recur in every perception by sight and touch ; and motion, though not essential in any case, is yet incessantly perceived. Our mathematical ideas in fact, like the skeleton in the human system, compose an intellectual frame-work, which pervades and upholds the whole fabric of human knowledge. The consequent frequency of their repetition, must naturally enable the mind to conceive them with unusual facility and precision.

It is somewhat difficult to ascertain the manner, in which the conception of geometrical solidity is originally effected. We cannot perceive it directly by any one of our senses. By sight, and by touch, we acquire the idea of superficial extension, with its concomitants, figure and length; for all the perceptions of these senses are essentially extended in this manner. When any solid substance comes in contact with the surface of the body, it excites a superfice in the organ of touch; and when light is admitted to the retina, the action resulting is superficially extended in that nervous membrane, and thence the object thus perceived appears originally to the mind as a plain superfice. When the exciting cause moves upon either of these organs, it excites the perception of motion. From these mathematical materials, the conception of a geometrical solid is probably effected in the following manner.

In early infancy, every motion of the body, and of its members, causes some peculiar sensation in the sensibility of the moving part; and excites at the same time, a perception of itself by the sense of touch, or of sight. The sensation which accompanies each movement, becomes in this way so firmly associated with particular ideas of motion, distance, and superficial extension, as to suggest them on all occasions. Consequently the various ideas of this kind, suggested by simultaneous motions of the body and its members in different directions, may extend through a solid portion of the brain, and excite the conception of geometrical solidity. Nor is it improbable, that the sensorial departments of sight and touch are so connected with their sensual organs, as to facilitate this effect. Thus, the visual department in the sensory may be so organised, and connected by the optic nerve with the retina, that in repeating the actions excited through the substance of that transparent membrane, it will extend them in depth to their proper proportion without much assistance from association. Every action of the retina is in fact extended in all directions; but its depth is vastly contracted in comparison of its outward surface. This contracted depth might, however, be magnified to its proper proportion in the sensory, merely by the natural organisation of the parts concerned; nor can we reasonably doubt, that in this way its amplification is at least facilitated.

When solid extension has once been conceived by the mind, it is afterwards suggested, with all its geometrical adjuncts, by various circumstances occurring in vision, with which it becomes associated. Thus, the distance of the object on which the attention is fixed, and consequently the whole space comprised in the sphere of vision, is suggested by its association with the voluntary adjustment of the eye, to see the object distinctly; by the separation of the double images of nearer objects in persons having both eyes; by the apparent size of the object; and by the distinctness of its perception, and its relative situation with respect to other things. The natural shades of light and darkness among the objects of sight, co-operate with these circumstances in suggesting shape, and the distance of collateral objects. We shall now proceed to consider the association of ideas.

In the material world, all the objects of sense are presented to the human organs in a state of combination. Solidity, extension, color, figure, gravity, &c. are combined in various modes and degrees, in every object that can excite a sensation or perception; and therefore in our ideas these properties become naturally connected in collateral associations. All our primitive perceptions and ideas are consequently complex. Thus, every visible shape and figure, involving a multiplicity of mathematical properties, is originally perceived in conjunction with particular shades of color, and is ever afterwards recollected with the same attributes of visibility, and the same mathematical adjuncts: the tangible solidity of an object recals its extension, with which it was primarily perceived: and every sound is remembered with some peculiarity of body, duration, and tone, by which it was originally characterised. The sensible properties of individual objects perceived by one sense, are thus in our ideas naturally combined in collateral associations.

There is also a collateral association of ideas, which is more remote and indefinite. yet equally unavoidable, being produced by the contiguity of objects in time and place. The eye commonly apprehends an extensive range of external things at the same instant; as the furniture in a room, the houses in a village, or the various objects in a wide spreading landscape. These things are not essentially connected by nature; but their real contiguity obliges us to perceive, and consequently to associate them in a single tribe.

DIFFERENT senses may unavoidably, or through choice, be excited at the same time, so as to connect their respective ideas in one association. Thus the visual idea of a horse, and the auditory idea of his neighing, by concurring with respect to time in their production, become collaterally associated; and the whiteness, solidity, and sweetness of a lump of sugar, which have often been perceived at the same instant, mutually recal the ideas of one another by collateral association. It appears then, that this mode of connexion constantly occurs in those ideas, which correspond to the constituent properties of single objects; and in those which correspond to objects and events, that are contiguous and cotemporary in such a manner, as to be simultaneously and attentively perceived as conjunct objects.

THE theatre of nature in which we live, does not display a stationary scene, but is incessantly revolving by its own energies, in conformity to the established laws of causation. The objects around as exhibit a new aspect every minute we behold them. The effect incessantly succeeds to its cause. And this natural succession of things, is regularly imitated by the perceptions they excite in the human mind. Hence, all our ideas unavoidably become connected, by consecutive association, according to the series of causation in the objects they represent. This, like the collateral combination of ideas representing constituent properties, is commonly established as early as the formation of the ideas concerned, and is afterwards reiterated nearly as often as they recur. It thus acquires that facility and power, which enable it to perform its important and extensive agency, in the intellectual transactions of human life.

THE celerity of thought exceeds the tardy revolutions of nature: the mind is able to anticipate an experienced event, and again recur to its cause. This process, assisted by voluntary efforts, reverses the train, and enables us to pass by association from the effect to its cause. The association of cause and effect among our ideas, must hence be possessed of a mixed nature, partly collateral but principally consecutive in both directions.

IN a variety of other instances independent of causation, our ideas are unavoidably excited in succession, and thence become consecutively associated. When we acquire a knowledge of an extensive building, or a complicated machine, too large to be embraced in one conception of the mind, we necessarily connect our ideas of its parts by this mode of association. And in travelling a journey, the objects successively perceived, are still more unavoidably conjoined in our thoughts, by the agency of the same principle.

BESIDES the natural associations of ideas, thus universally formed, each individual has artificially established, a multiplicity of others in his own mind. The principal business of education indeed, consists in abstracting, modifying, enlarging and multiplying their combinations.

The fabric of written and spoken language, itself a magnificent and useful acquirement, and the medium of other acquisitions, consists in a vast assemblage of collateral and consecutive associations artificially established. The idea, the articulate sound, the written character, and the act of enunciation, are all collaterally associated; whilst each one of them is composed of subordinate parts, connected by nature and art in tribes and trains. The idea itself is composed of items, which in general are collaterally, but sometimes consecutively combined. The sound by which it is expressed, comprises, with its characteristic nature as excitement, the ideas of number, time, quantity, and its peculiarities of body and tone, collaterally conjoined: consecutively, it embraces the the different modulations or syllables that compose it; and the vocal organs in pronouncing it, perform a corresponding series of motions. The written character is an assemblage of colored figures, joined collaterally in reading, and consecutively in spelling. The expression of our more compounded ideas, and propositions, is effected by the consecutive combination of words into phrases and sentences.

All other arts and sciences cultivated by man, consist in like manner, of tribes and trains of ideas and muscular motions, the foundations of which were established by nature, and the superstructure imposed by art. All our propositions, precepts, and maxims, whether scientific or practical, whether relating to the abstract nature of things or the conduct of human life, consist in associations of ideas, copied from nature and multiplied by invention. By the consecutive combination of those which are congenial and consistent, we form a system of science, a volume of history, or a work of imagination.

HENCE the adult man finds all his ideas naturally associated in tribes and trains, corresponding to the natural combination and succession of their objects. He also finds a great many artificial associations, which have been established by the discipline of education. They may all be reduced to three kinds of collateral, and three kinds of consecutive associations, according to the different methods by which they have been formed. 1. Collateral associations of ideas, produced by the natural combination of constituent properties in external things. 2. Collateral associations, produced by the accidental contiguity of things in time and place. 3. Collateral associations artificially established. By the other mode of connexion, we have, 1. Consecutive associations of ideas, produced by the succession of cause and effect. 2. Consecutive associations, produced by an accidental succession of things, as in riding along a road. 3. Consecutive associations artificially established.

WE have already insisted on the great imperfections of human knowledge. We have no ideas, but those of mathematical properties, which afford complete scientific information, by adequately representing their objects. All the rest of our knowledge is radically composed of those conceptions, which are termed ideas of sensible qualities; and which are merely effects produced in the sensory, by certain powers of external objects, to which they bear not the slightest resemblance. We must hence acknowledge, that we are substantially ignorant of all those powers, and energies. in the material world, which produce the incessant changes of nature in the order of causation. In the few and inadequate ideas they excite, we can discover no traces of the operations and effects, which they are calculated to display. Hence experience, as Hume has demonstrated, is our only guide in all those affairs, in which causation or the energies of nature are concerned. And the principle of association in the human mind, is the basis on which the acquisitions of experience are built. It is the only representative, in the ideal system, of all the efficient principles of nature. When effects are evolved by their causes, the efficient agency eludes our discernment; but the principle of association connects their ideas in the mind, according to the manner in which they stand connected in nature, and thus performs, in the intellectual scene, a function corresponding to the energies of external things. And it is hence from the operation of this principle, that we obtain our very inadequate conception of power. In the transition of thought, from the conception of a cause to the idea of its effect, we feel a kind of forcible progression in the mind, and this feeling is the radical constituent in the notion of power. In every other instance of consecutive association, a similar sentiment may be experienced. In our voluntary actions, we are particularly conscious of an effort, or sentiment of exertion, that accompanies the process of association in which they consist. The abstract conception of a cause, in which this sentiment is the most essential ingredient, is thus the only notion of power, which the human mind is able to obtain

The experience, which is founded on the association of cause and effect in our ideas, constitutes nearly all our practical and useful information, in the affairs of human life. There is indeed neither art nor science cultivated by man, except the mathematical, in which the process of causation is not fundamentally concerned, and in which this mode of association is not, therefore, the basis of our knowledge and practice. But there is a peculiarity in the association of ideas yet unnoticed, on which the utility of experience, acquired by this principle, is materially dependent. It is the peculiar effect, incident to the resemblance of ideas, and may be termed an extemporary association.

The perception of the likeness, revives a portion of excitement, which enters into the conception of the original; and this portion, by its previous collateral association with the other parts of the conception, necessarily revives the whole original idea. Thus, when I view the portrait of an acquaintance, the action it excites in my retina, is in part the same that was excited, by viewing the person himself; and therefore, by a previous association of this part with his other characteristics, it necessarily suggests the whole idea of his person. So when I perceive an event, similar to one which I formerly observed, by reviving some part of my prior conception, it causes the remembrance of all the circumstances formerly perceived in that occurrence. It is in this manner, that a belief in apparitions is produced. When a timid person walks in a dark and lonesome place, his situation revives in his mind, all his ideas of spirits, hobgoblins, and frightful animals, with corresponding sentiments, according to associations established in the nursery. The whole attention of his mind, is thus directed to the perception of those frightful objects. Consequently, when he sees an appearance, resembling one of his terrific ideas, it suggests that idea so forcibly, the mind being predisposed to conceive it, that he mistakes it for an actual perception. What ever is defective in the real appearance, is supplied, with percipient energy, by its association with that appearance and his fearful feelings, aided by the invigorating power of attention.

But the influence of this extemporary association, is not confined to the transactions of timid credulity. The philosopher and the statesman, the general and the artist, are dependent upon it for the performance of their mental and manual labors. It is the only way, in which their experience can be rendered useful. The most comprehensive knowledge of nature, and the most perfect intimacy with human affairs, would be entirely unavailing in practical operations, if present appearances were not, by this principle, instantaneously identified with similar circumstances, previously experienced, which will direct our thoughts by association, to the effects that are now to ensue. When any event, or state of things, occurs to my senses, it immediately suggests the analogous case, which formerly transpired, and thus enables me in a moment to predict its consequences, and adapt my conduct to the circumstances of my situation. In proportion to the extent of coincidence in their ideas, will be the force with which the present will suggest the prior occurrence; and in the same proportion, will this process produce confidance in me and regulate my conduct.

When I have repeatedly observed a particular event to be connected with another in the order of causation, and have had no contradictory experience, their ideas become firmly associated in my mind. If an event now occurs to me, perfectly similar to the cause in the former instances, it must necessarily, on these principles, revive my conception of the effect, with a degree of force, that will command my unlimited assent, and practical compliance. When the previous association is weaker, and the analogy less perfect, proportional hesitation and distrust will interfere. Nearly all our practical decisions, in transacting the most common, and the most important affairs of human life, are thus produced entirely by associations of ideas, which operate with a degree of celerity and force, that greatly excels the tardy and incompetent operations of reason.

Having discussed the association of ideas, the subject of abstraction should next be investigated: but it is necessary first, to enquire succinctly into the nature of ATTENTION.

The attributes of attention, as they are apprehended by consciousness, we deem it unnecessary to describe in the present instance. They are sufficiently familiar to the reader. We will therefore proceed directly to consider its fundamental properties. On examining the intellectual actions, to which we are conscious of attending, we are able to discover two peculiar circumstances in their performance, in which we must consequently conclude, that the power of attention consists. They are, first, the relative situation of the ideas, to which we attend, in the sensorial department that performs them; and secondly, the association of such ideas and sentiments in one department, with those which are simultaneously regarded in all the others.

I. There seems to be a central portion, in the sensorial department corresponding to each organ of sense, which performs its actions with more precision, vivacity, and effect, than the surrounding parts. Whatever sentiment or idea becomes most interesting, is habitually transferred into this portion, and there becomes the subject of attention. In the organ of vision, which is the principal source of our ideas, this doctrine may be exemplified and proven. By the structure of the eye, and the principles of optics, the sphere of distinct vision is necessarily circumscribed within narrow limits. Only a small portion of the various rays received from the whole hemisphere of vision, can be accurately converged to a focus on the retina, and produce perspicuity of perception: This portion is naturally the object of attention, and is habitually received on the central part of the retina. The actions of all the rest of this organ, are necessarily indefinite and obscure. To whatever object we desire to attend, we adjust the position and form of the globe, so as to pourtray its image with precision on the centre of the retina; whilst the indefinite impressions of other objects, are received on the surrounding parts. The centre of the retina, is thus by nature and custom constituted the seat of attention in this organ. And all its actions are reiterated, without any material change or modification, in the visual department of the sensory. The central portion of this department, must consequently be the scene of perspicuity, and the seat of attention, in the visual transactions of the mind. Something similar occurs in all the other departments, but cannot in them be so distinctly demonstrated.

II. THAT the sentiment or idea, which occupies the seat of attention in one department of the sensory, is generally associated with those, which are simultaneously the subjects of attention in the others, is a matter of fact, ascertained by the agency of consciousness. Its explication is natural and easy, according to principles already established. When any conception is excited, with a degree of predominating energy, which enables it to occupy the seat of attention in its peculiar department, it must necessarily revive in the others, with proportionate power, their peculiar actions with which it has been previously associated. And thus it is effected; that all the seats of attention throughout the sensorium, are simultaneously occupied by perceptions, and sentiments, and ideas, which relate to the same subject; that the various actions of the intellect, derived from the different sensual sources of excitement, progress harmoniously together in the brain; and that the whole attention and powers of the mind, may be concentrated on a single topic of investigation.

FROM this view of the subject, it follows, that the principal conception among those to which we simultaneously attend, and which has principally introduced the others by association, must have originally been excited with more energy, or have been more interesting, than any of its cotemporaries; and that no other one can supplant it, without acquiring a similar superiority of power and interest in the transactions of the mind.

It is particularly true, in the actions performed by the extensive department, corresponding to the sense of feeling, that the most energetic becomes the subject of attention; and it is equally true, that the actions of this department, possess a greater influence on the general attention of the sensory, than those performed by any other; for it is obvious, that we constantly attend to that which is most interesting. The strongest sentiment at any time experienced, regularly suggests to the mind, or introduces to the seats of attention throughout the sensory, all the ideas and perceptions with which it is most intimately associated. And if an idea be accidentally excited with such force, as to be regarded with attention on that account; unless it can generate a predominating sentiment, it will in a moment be neglected and obliged to disappear. It is thus apparent, that *feeling* is at once the primary source, and the ultimate object, of all the mental and bodily exertions of man. It governs his attention, the current of his ideas, and the train of his voluntary actions; and to render it pleasurable at present and in future, is the whole business of his life. The epicure and the stoic, the atheist and the devotee, pursue in different ways, according to their different convictions, the same ultimate object, pleasurable sensation.

It appears on the most careful consideration of this subject, that the relative situation of the idea, is less important to attention, than its association with the contemporary ideas and sentiments in the other departments. By a species of voluntary effort, I can attend to the perception of an object of sight, whose image is obscurely portrayed on a remote part of the retina; but I am unable to conceive with attention, any idea which is not associated with some predominating sentiment, and with the ideas prevailing in the other parts of the sensory.

Attention is said to be voluntary: the power of sentiment to controul it, will enable us to explain this point. We constantly attend to that which is most interesting; nor can any voluntary effort confine the attention to that which is opposed by our strongest feelings. The sense of duty and of interest, is continually directing our thoughts to things that are intrinsically indifferent; but it does so, by predominating over all the sensations and sentiments, which are at the same time excited by other objects. Hence, that we may be able to direct our attention and conduct, to the performance of our duty and the attainment of remote interest, undistracted by temporary allurements, it is of the utmost importance, that in the education of youth, the highest grade of pleasurable sentiment should be associated with the abstract conception of virtue, constituting what may be called a MORAL PREJUDICE.

Having taken this preliminary view of attention, we are now ready to investigate the abstraction of ideas; a subject which to us appears very simple and brief, though it has caused much discussion and controversy, among the writers on the human mind.

All our primitive ideas are complex. They consist of parts collaterally associated, in conformity to the natural combination of constituent properties, in the objects they represent. The various modes in which these properties are combined in nature, produce in the mind a corresponding variety of complex ideas. But they are all composed of the same elements, which are few in number, according to the apparent simplicity of structure in external things. These elementary parts are called abstract ideas; which are of two kinds, general and simple. They are generated in the mind by the process of abstraction, which we shall now attempt to explain.

The same elementary parts enter into the composition of all our primitive complex ideas; but their number, their distinctness, or their mode of combination, is varied in every individual conception. We rarely meet with two objects, either natural or artificial, which do not exhibit an obvious dissimilarity in their appearance. Even the individuals of a common species, are in general conspicuously diversified in their sensible qualities. The continual recurrence of this diversity in our earliest perceptions, necessarily breaks and dissevers that intimacy of combination, which is natural to the constituent elements of our ideas. The actions representing those constituent properties, which occur most frequently, and are marked most distinctly, in the combinations of nature, necessarily acquire a facility and force, which enables us to conceive them with peculiar ease and distinctness. And thus we become capacitated to distinguish, with clearness and precision, all the simple ideas, which enter into the most complicated conception. By exemplifying the abstraction of a systematic idea, this process may be still more clearly illustrated. Individual objects of the same kind, possess various appearances, which distinguish them as individuals; and they possess other properties in common, which characterise them as belonging to the same species. By successively perceiving a great many of these objects, the complex idea representing their common properties, must, according to the laws of excitement, become more energetic and exciteable, than those representing their individual characteristics, which are very numerous and less frequently repeated. And thus an abstract idea of the species is produced. Hence, all our abstract ideas, systematic and simple, are unavoidably generated in the mind, by that very sensitive intercourse with external things, by which it acquires its knowledge of individuals, and its primitive complex ideas.

The extent to which the process of abstraction can proceed, may easily be ascertained by any person, who will consciously attend to the operations of his own mind. He will discover, that no abstract idea can ever be distinctly conceived by itself. The association of the constituent items in a complex idea, can only be subverted to that degree, which will enable him to make them separately the objects of his attention. We can neither conceive a colour that is not extended, nor a visible exten.

sion that is not colored; but we can so far dissever the union of these simple ideas, that we may attend to one, without regarding the others, with which it is unavoidably conceived.

All the objects in nature, and consequently their ideas and sentiments in the mind, are variously connected and related to one another, both in their individual and general characters. The simple and systematic ideas, and sentiments, derived from one of them, must therefore become variously associated and connected with those derived from another. Consequently any predominating sentiment, or perception, to which we attend, must occasionally revive with energy, and introduce to our attention, the abstract simple and general ideas derived from correlative objects. And it is thus the association of the abstract idea, with some predominating conception, and the energy it thence acquires, which render it a distinct object of attention.

That process of abstraction, which developes the simple elements of a complex conception, affords a fundamental and complete specimen of scientific analysis. When the analytic method, is voluntarily practised upon a larger scale, it is merely a complicated imitation of this natural and simple process, and generally depends upon it for its success. It consists, in developing all the fundamental principles, involved in a complex conception, or complicated class of ideas, which has not been completely analysed by ordinary abstraction, to which it is merely supplemental. And it is perfect, in proportion as it practically resembles that process, and produces the same results.

The modern method of induction, is likewise a voluntary extension of the abstracting process, by which systematic ideas are formed. It consists, in collecting all the facts, or individual complex ideas, which relate to some particular subject, and considering them attentively, until they generate abstract ideas in the mind corresponding to their common properties. These abstract ideas or the common properties they represent, constitute the fundamental principles, or the general facts, in the science to be developed. The voluntary labor of discovering them, as in the case of analysis, becomes necessary, only when the subject is too complicated or remote, to be systematised by common observation.

Mr. Locke, in his very able book upon ideas, has discussed, under the title of mixed modes, a class of conceptions, on which I would make some remarks. It appears very plain to me, that he is greatly mistaken when he affirms, that the complex ideas, which he has thus designated, are arbitrary combinations, made by the mind without regard to the realities of nature. On the contrary, all those ideas are correct, or intended to be correct, representations of certain events, and combinations of things, which have occurred, or which may occur in the ordinary course of causation. Thus, the ideas expressed by the words, obligation, lie, army, beauty, and gratitude, which he mentions for examples, do undoubtedly represent in the mind, certain real events and combinations of objects in nature. Nor is there any complicated conception of this kind, that for convenience in social intercourse has been particularly noticed and named, which is not believed to represent some complicated reality. By education in the present state of society, we acquire many of these associations, without having perceived the combinations they represent; but that does not render them fictitious and false. Another fundamental error in the same book, is the opinion, that our simple ideas are primary, and our complex ones artificial. On the contrary, we never experience even a single sensation which is perfectly simple.

THE discussion we have now finished, appears to authorise the following classification of ideas.

I. PRIMITIVE COMPLEX IDEAS. The external objects of perception, are all compounded of parts, which excite peculiarities of action in the organ that perceives them. Some of these parts are essentially combined and co-existent, in the constitution of the object; whilst others are only contiguously conjoined by nature and accident. The complex conception of the former is composed of simple ideas; that of the latter is an association of complex items, constituted of simple ideas like the former.

II. SYSTEMATIC IDEAS. The first perception of an object, has doubtless an uniform and homogeneous appearance in the mind; but the repetition of perceptions, in which the same constituent parts are variously combined, interrupts this uniformity of appearance, and enables us to recognise the complexity of the conception, and distinguish its component parts. By frequently perceiving objects that belong to a common species, the parts of the perception representing their specific properties, become more excitable than the others, so that we are able to conceive them with peculiar distinctness and force; and thus our abstract systematic ideas are generated. By generalisation and induction we voluntarily multiply these ideas, and form systems of science.

III. Simple ideas. The general process of abstraction, which in one case generates the systematic ideas of science, being carried still farther in a different shape, terminates in developing to our attention, the ultimate elements of human knowledge, which we denominate simple ideas. By the method of analysis, which imitates this mode of abstraction, we develope, particularly in mathematics, the ultimate items in the most complicated conception. To these three distinct classes I shall add one more.

IV. Propositional ideas. Under this title may be comprehended, all those combinations of ideas, which are expressed by sentences, in the intellectual intercourse of mankind. They are not radically distinguished, by any exclusive properties, from other complex conceptions. There are two circumstances, however, by which they are sufficiently characterised. They are generally more complicated, than those of the former classes; and in conceiving them, the attention of the mind is generally directed to some particular part, or to some peculiarity in the mode of their composition. Those complex ideas, which are not very complicated, and which frequently recur in the common operations of the mind, are expressed by single words for the convenience of social intercourse, and constitute the ideas of the first and second classes. Those which are more complex and uncommon, it is more convenient to describe by the circumlocution of a sentence; and even those which have been named, are frequently communicated in the same way, by which they are rendered propositional. But in this case, there is always something peculiar in the mode of our attention. Thus when I say, man is mortal, I express nothing more than the systematic idea of mankind; but I direct my attention particularly to the attribute of mortality, which enters into its formation. More frequently in propositional ideas, the attention is directed to the manner of their composition; constituting what are called by Locke, the ideas of relations. Thus when I affirm, that any two sides of a triangle are greater than the third, I express a complicated conception, in which I attend particularly to the manner in which certain parts stand connected, or related, to each other, by their common property of magnitude. It has also been found convenient, to express many ideas of relations by single words, or correlative terms; for these ideas are extremely numerous and are incessantly the subjects of consideration. We formerly enumerated six distinct sources, from which permanent associations of ideas are derived; and we observed, that resemblance is the source of an extemporary association, whose agency is extensive and important in all the transactions of the mind. We perhaps never experience a single conception, which is not connected to others by all these different modes; and in each one of them, there is an incalculable variety of subordinate modifications. Consequently the relations of our ideas, which is only another name for these associations, must be infinitely diversified; and to investigate, to conceive, and express them in the propositional manner, constitutes the principal part in the intellectual labors of human life.

I SHALL conclude the present chapter, by making some remarks on the employment of language, as an instrument of thinking. To understand this subject completely, it is necessary to recur to the topic we have just been discussing.

IT is very obvious on the slightest reflection, that our ideas either sensible or abstract, rarely become the subjects of deliberation, in their capacity as individual representatives of external objects. Very early in life, we acquire all our fundamental ideas so perfectly by perception and abstraction, that we rarely have to deliberate in our riper years concerning the completeness and adequacy of the representations they make. We are habitually satisfied, that they are such in our minds, as their objects should naturally excite in the human intellect. And this acquiescence in their perfection, generally extends to all those combinations, which, being viewed as individual objects and events, have had names appropriated to express them. The deliberations of the mind, on the contrary, are mostly employed on the associations, or modes of connexion, which exist in the more complicated tribes of individual ideas. Thus, all our customary trains of thought, are composed of those conceptions we have denominated propositional, in which the attention is generally directed, to the mode of association between their principal parts. By continually reiterating these conceptions, and attending to the various trains of association, or intermediate parts, which connect their principal items together, the connective actions become gradually more excitable, energetic, and distinct; whilst all the others through neglect, become enfeebled and partially intermitted. By the process of abstraction, the properties which distinguish our primitive ideas from each other, are cast into obscurity and disuse, in all reflections of a general nature: by the power of attention, a similar effect is produced in propositional conceptions; all the items on which the association considered does not intimately depend, being necessarily disregarded, are rendered feeble and inconsequential, or entirely omitted in the actions of a cultivated understanding.

We have no sooner acquired ideas in infancy, than we begin to associate them with words: and by the continuation of this process, and the daily repetition of its products, all the fundamental and distinct ideas to which we have attended, become firmly associated with terms to express them. The communication of proportional conceptions, requires us to connect these terms together in sentences, in which the principal ideas of the conception are expressed by substantive nouns, and the mode of their association, to which we attend, by the verbs and particles. Hence the verb, from representing that part of the conception to which we attend, is considered as the principal part of speech; and for the same reason, the beauty and force of language, as remarked by the critics, depend chiefly on the right use of particles. Combinations of words, representing propositional ideas, are incessantly reiterated in conversation, in reading, and even in the most recluse contemplations of the closet. Hence all the most common words, representing the most familar ideas, or objects of nature, become slightly associated together in the memory, in conformity to those associations of their ideas, to which we have most frequently attended, and which we have frequently employed them to express. When we hear a succession of words in conversation, or read them in a book, we are hence generally able, from the ease or difficulty with which we conceive them, to decide instantaneously, on the truth or falsehood of the proposition they express, without conceiving the ideas of which it is composed. If all the associations involved, are conceived with facility from previous repetitions, we know that the proposition expressed, must be correct. But if any word, or connexion of words, occurs in the sentence, to which the auditory department has not been familiarised, it obstructs the easy progress of the conception, and through the energy of feeling excited by its novelty, revives its corresponding idea; and if the relation be not then sufficiently clear, a second effort revives the whole propositional conception to be scrutinised. We not only thus attend to the words of others, and judge the propositions they express, without regarding the ideas that compose them; but in speaking ourselves, and even in recluse contemplation, on familiar subjects, we generally confine our attention entirely to the words we employ, without conceiving the ideas they express.

Two causes may be assigned for the adoption of this practice: its adequacy to the ordinary purposes of thought; and the facility it affords to the ordinary operations of the mind.

When the words of a sentence, representing a propositional conception, are associated together according to the association of the ideas they signify, it is very unimportant, whether we attend to the connexion of the words in the sentence, or to the connexion of the ideas in the conception. It is only when an assosciation has not been formed between the words, that a recurrence to the ideas becomes indispensible. The other cause for this vicarious mode of thinking, is equally plain and satisfactory.

The words of a sentence, consist of small distinct portions of sound, which are consecutively conceived in one department of the brain. On the contrary, the ideas they represent, frequently consist in large and complicated conceptions, which embrace the actions of various departments in one collateral association. It must consequently be much easier to conceive the words alone, than to conceive them in conjunction with the ideas they signify. They must not only be conceived, with much less intellectual labor; but also with much greater celerity; which is often a very great convenience in the intellectual transactions of life. A practice possessed of these advantages, which is ready to force itself on our acceptance, must naturally be adopted and pursued with alacrity.

The ancient philosophers had no knowledge of this vicarious method of thinking, in which the auditory department becomes a substitute for all the other parts of the sensory. Since its discovery by the moderns, some late writers have been extravagant in their opinions concerning it. They have asserted, that it is the only manner in which the mind can speculate on general subjects. They affirm, that the mind cannot conceive an abstract idea; and that of course our thoughts must have always been confined to particular objects, if they could not, by substituting abstract terms for ideas, thus be rendered general. A little conscious attention to the common operations of the mind will rectify this error. It may thus be demonstrated—that we *can* conceive the systematic and simple properties in a sensible idea, so as to render them distinct subjects of attention; which is all that is necessary for the various kinds of rational speculation—and that, in abridging the labors of the intellect, we substitute words indiscriminately for all kinds of ideas, whether sensible, systematic, simple, or propositional. The substitution of auditory actions, for the ideas and sentiments of the other departments, is not essential in any instance, but is always practised for convenience; and is therefore equally as necessary, when our thoughts concern particulars, as when they become general. If the proper names of individual objects, recal their sensible ideas more frequently, than abstract terms revive the ideas expressed by them; it is because our familiarity with such objects, has rendered their conception so easy, that its omission would not facilitate the process of thought. The incidental, but clear, and judicious observations of Locke upon this subject, describe the whole affair, as it really occurs to the apprehension of consciousness. It all amounts to this; that we originally thought, and still can think on any subject, by conceiving those ideas alone which properly belong to it; and that for convenience, we have learnt in familiar matters, to effect vicariously by words, the practical ends of complete thinking; or to substitute the brief and easy actions of the ear for those of all the sensory.

CHAPTER X.

CONCERNING SENTIMENTS.

THE organs of certain senses; as of taste, smell, and feeling; are not calculated to introduce any clear and scientific intelligence of the objects by which they are stimulated. Their excitement is termed sensation; and its distinctive attributes are pleasure and pain. It is propagated to the sensory, like other sensual excitement, and reiterated in the appropriate sensorial department. When this sensorial part of sensation is afterwards revived, without the sensual action from which it originally sprung, it is in this work denominated sentiment; but in common discourse, it is more frequently termed an emotion or passion of the mind. That our simple sentiments, or mere recollections of former sensations, correspond to this statement in every respect, is very obvious; but it is not so clear, that our emotions and passions have likewise originated in sensation. To prove that they are combinations of simple sentiments, and have consequently sprung from sensation, is the principal object of the present chapter.

Sensations and sentiments are naturally permanent: they cannot rise and vanish in an instant, like our ideal conceptions; nor be excited and revolved in the mind with facility by the power of volition. When produced by a stimulus, or revived by a simple association, they are restive and arbitrary, directing the attention from themselves to some congenial or associated object; and when they disappear, they cannot voluntarily be recalled, so as to enable us to analyse and compare them. Hence the philosophy of the passions has been cultivated with less success, than any other part of metaphysics, though probably the most important.

In the present investigation, it is first necessary to consider the subject of simple sentiments, with some other preliminary topics. Every physical influence, that can stimulate the sensibility of any part in the system, produces a pleasurable or painful sensation with peculiar properties, corresponding to the structure of the part in which it is excited, and the nature of the object that excites it. The external organs of taste, smell, and cutaneous feeling; and the internal viscera in the thorax and abdomen, the lungs, heart, stomach, &c. are excited into various sensations, by a multiplicity of internal and external stimulants. But it is not always the positive application of a principle which produces the effect. A change of circumstances, or the abstraction of some customary influence, is often the cause of excitement in those organs. Thus the absence of food, drink, fresh air, and caloric, excites the disagreeable sensations of hunger, thirst, suffocation, and cold. The cause which produces pleasurable excitement is denominated good; and that which produces pain is termed evil.

The efficient object, or change of circumstances, is commonly perceived by the other senses, at the time of its agency in producing sensation; the sentiment it originates, must consequently become sssociated with its conception in the other departments of the sensory, so as to be subsequently revived by the recurrence of that conception. Thus the visible qualities and solidity of a lump of sugar, being perceived by the eye and the sense of touch, when it is applied to the palate and excites the sensation of sweetness, become associated with this sensation, and afterwards revive its corresponding sentiment, as often as they are remembered. So the idea of a book in which I have read a pleasant story, becomes connected in my mind with the sentiments it excited, and will again recal them by association: and the intolerable pain excited by the application of a burning candle to my finger, is partially revived as often as I reflect attentively on such an event. In this way the idea of every object, that can affect us with pleasure or pain, becomes associated with the particular sentiment which it causes. Hence the simple conception of any thing good or evil, invariably produces some degree of pleasurable or painful emotion in the mind, possessing the characteristics of the sensation which the object has previously excited.

The strength of the sentiment thus revived by association, is proportionate to the energy of the ideal conception with which it is associated. Thus the mere idea of a delicious fruit, raises a pleasant emotion and desire of tasting it; but the actual perception of it, when presented to the senses, produces a more lively and strong desire, corresponding to the superior energy of perception. So the presence of a beautiful woman excites our social feelings more forcibly, than the simple idea of her person when absent. For it is a law of association, that the energy of the primary, is transferred to the secondary action.

IT is necessary to distinguish, between the mere conception of a sensual object, and the idea of its application or enjoyment; for the latter has more influence in reviving the sentiment, than the former; and its influence also varies, according to the energy with which we conceive it. Thus the mere conception of an object, capable of giving pleasure, partially revives the pleasant sentiment it formerly produced; the idea of enjoying it revives that sentiment in a higher degree, which constitutes desire; the probability of its enjoyment, which renders the conception much stronger, raises also a higher grade of sentiment, amounting to the degree of hope; and the certainty of its enjoyment, producing a conception still more energetic, raises the passion to the highest degree, at which it is termed joy.

HENCE we may remark in every simple sentiment, a regular gradation of mode and degree, from the slightest emotion, to the actual sensation from which it was derived. The mere idea of a sensual object, revives a pleasant emotion, which is the lowest grade of its peculiar sentiment: the simple idea of its enjoyment, excites the same sentiment in that degree, which is called, a desire of the object: the probability of enjoying it, excites the sentiment with still greater energy, amounting to the degree of hope: the certainty of its enjoyment excites the highest grade, which is called joy: and the reality itself produces the original sensation. A similar series of sentiment occurs in the case of an object that is disagreeable. The mere conception of it, is unpleasant; the idea of its acting upon us, excites aversion; the probability of it. produces fear; the certainty. causes grief; and the actual misfortune excites the painful sensation itself. Similar circumstances also attend the revival of those compound sentiments, which are usually termed passions and emotions, when revived by the recurrence of the ideas and perceptions with which they are associated. But as none of them corresponds to an individual sensation, they can never be elevated, by the actual enjoyment or suffering, above the degree of joy and grief. It should also be observed, that the custom of language does not permit us to apply to them indiscriminately, the terms desire, hope. joy; aversion, fear, grief; which express the gradations occurring in simple sentiments. These terms indeed are principally employed to express the degrees of those simple and compound sentiments, which are merely pleasurable or painful, without possessing peculiarities which would entitle them to particular names.

There is a peculiar source of sensations and simple sentiments, which we have not yet noticed. It was formerly remarked, that every kind of excitement, originally affects the sensibility of the part in which it occurs. In most cases this collateral effect ceases to be produced, as the principal action gradually becomes familiar. But in a few instances it continues throughout life to be experienced. Thus the perception of a brilliant and expanded color, invariably excites some pleasurable emotion; and certain peculiar bodies of sound, as those produced by musical instruments, are intrinsically beautiful, or pleasing to the ear. Every great and sudden change of the excitement progressing in any part, is likewise a primitive source of sensation. Thus every sudden and unexpected transition, which occurs in a train of common ideas and perceptions, raises that kind of emotion which is called surprise; but in this particular instance, the effect is much augmented by the power of habit.

Each organ of sense has a portion of the brain consecrated to the repetition of its excitement; and in those which are the instruments of perception, in the eye for example, each portion of the percipient nerve, has a particular allotment in the sensorial department. Something similar occurs in the department that reiterates our various sensations. The flavor of an apple, the odor of a rose, and the warmth of fire, excited in different parts of the organ of sensibility, may all be distinctly experienced at the same time, and must therefore be reacted in different parts of the brain. But although these specific sentiments, may be cotemporary and distinct in the sensory, yet we have it not in our power, to give them all an equal degree of attention at the same time. There is constantly some superior and predominating individual among them, to which we chiefly attend, as in the corresponding case of contemporary ideas. We may therefore conclude, that in the sentimental department, as in all the others, there is some particular portion destined to perform the predominating action, and thus to be the permanent seat of attention. This department is consequently organised, and governed in its actions, like those which are peculiarly adapted to the operations of the understanding.

IT appears to me highly probable—that the region in the sensory, which corresponds to the stomach and reiterates its sensual excitement, constitutes the seat of sentimental attention—and that the proper action of this part derived from the stomach, has naturally no strong disinguishing attributes; but combines indifferently with any predominating sentiment that is transferred to the seat of attention, and imbibes its peculiar characteristics. It is demonstrated in the daily rotine of stimulation, that the stomach is the seat of strong sensual action, which by unity of excitement promotes the general activity of the system. Yet we are rarely conscious, that this important action does occur. It has commonly no distinctive property, like other sensations, which may be apprehended by the mind. We can only demonstrate its existence by its effects. Yet when we experience any strong emotion or passion, revived by its association with particular ideas and perceptions, we habitually refer to the stomach as its seat. We may seem to feel it in every fibre; but in the parts situate in the precordia, it seems to be pre-eminently strong. The heart, by a small anatomical mistake in the vulgar, is proverbially the seat and the source of the human passions and affections. This habitual reference to the stomach, or parts in the precordia, as the principal seat of strong feelings, seems to prove, that the predominating passion is actually situated in that part of the sensory. which corresponds to the stomach. For the suggestion of the stomach as the organ of the sentiment, can only proceed from an association of its idea, with similar sentiments previously observed to originate in this place. I shall therefore consider it as established; that the portion of the sensory, which corresponds to the stomach, is the seat of attention in the sentimental department; that its proper excitement derived from the stomach, its sensual organ, has in general no particular character of its own, but combines indifferently with any sentiment, that is transferred to the seat of attention, and assumes its peculiar, distinctive, attributes; and that the sentiment thus produced, constitutes the ruling passion of the mind. But the truth of these positions, will not be found essential to the correctness of any subsequent speculation on this subject, in the present work

WHEN two sentiments are simultaneously excited, with high degrees of energy that are nearly equal to each other, we naturally direct our attention to them alternately, or reiterate them successively in the seat of sentimental attention. But sentiments are naturally permanent: that to which we attend in the present moment, cannot be instantaneously discontinued, for the purpose of attending to another in the succeeding point of time. Consequently those predominating sentiments, to which we alternately attend at short intervals, must become blended together in the seat of attention. and produce a compound sentiment intermediate between them; as the intermixture of red and green rays produces the intermediate perception of *yellow*. If the primary sentiments be congenial; this circumstance will render their coalescence more speedy and complete. And if the objects that excite them, be intimately connected together, so that the general attention of the mind readily and frequently passes from one to the other; this process will facilitate their simultaneous transference to the seat of sentimental attention, and their consequent coalescence into one single emotion. In this manner, the contemporary energetic actions in the sentimental department, must be constantly blended together by the power of attention. Now it is evident, that those causes of particular sentiments, which are connected in nature, and frequently occur together, must in this way produce a compounded passion, that shall become as distinct and excitable as any simple sentiment, and at the same time become associated with the complex conception of its radical causes. Thus, the sexual appetite, the emotion raised by personal beauty, and the friendship produced by the intercourse of congenial minds, being frequently excited by different qualities in the same person, become intimately blended together, constituting the passion of love; which is subsequently revived as an individual sentiment, by association with the complex conception of the beloved person.

If this be a correct account of the process, by which the passions and emotions of the mind, are produced from simple sentiments and sensations; we should expect to find very little precision and distinctness in sentimental conceptions. No sentiment either simple or compound, which is not pre-eminently strong in comparison with its rivals, could possibly escape their modifying influence, and preserve its original characteristics. A little attention to the train of our daily feelings, will prove, that the fact corresponds to the deduction. I am not conscious, that I ever experienced two sentiments precisely similar. The great variety of words, employed in every language, to express different modifications and degrees of the same passion, tends to establish the same truth. This continual blending and indefinitude of sentiments, produce great embarrassment to those, who investigate this part of our nature. They will prevent us, in the present attempt, from attaining to that degree of precision, which would be satisfactory and conclusive.

We will now proceed to investigate our affections, for the purpose of proving, that they are all derived originally from sensual excitement. To establish this position, it will not be necessary to examine every modification of sentiment, which there is a word in the english language to express: it will be sufficient to select and investigate some of our principal emotions and passions; nor will it even be necessary, to trace all their component parts to the sensual sources from which they have originated. If we can show, that in the common experience of mankind, circumstances must occur, which are sufficient, according to the principles already developed, to construct those passions from others either simple or compound; we will be authorised to draw a very probable conclusion, that they have been thus constructed, and that all the others are similar compositions of simple and compounded sentiments, which originally sprang from sensation.

We shall first consider those which are properly termed emotions; as the compound sentiment, for example, which is raised by the perception of personal beauty.

Some writers of great eminence have referred the origin of this emotion, to circumstances experienced in the earliest stage of our existence. When the infant is first placed in its mother's bosom, it feels an agreeable sensation of warmth; its palate, olfactories, and stomach, are gratefully stimulated by the natural food prepared for its sustenance; its senses of touch and feeling are agreeably excited, by the soft and curvalineal surface of the milky fountain; and at the same time it acquires by sight and touch, a complex conception of those parts. By the frequent repetition of this experience, the simple sentiments arising from those sensations, are blended into one pleasurable emotion, which becomes associated with the conception of that regular curvature of superfice, occurring in the female bosom, which is known to be the principal ingredient in beauty of figure.

We cannot doubt, that these circumstances will, in some degree, produce the effect which is here ascribed to them; yet they are not the principal source of our sensibility to beauty; for those who have not had the happiness of being cherished in the female bosom, are not observed to be deficient in taste. A more extensive and effectual experience can be assigned for the production of this sensibility. By the gravitation of our bodies, and the necessity of human affairs, we are incessantly brought into contact with a great variety of material objects. And it is universally true, that the substances, which are angular, hard, and rough, excite painful sensations in the organ of feeling; while those that are bounded by curvalineal surfaces, and are moderately soft and smooth, are quite agreeable to the same organ. Hence these latter properties become the elements of beauty in material objects, and revive, when perceived by sight, the pleasurable associated emotion which we ascribe to beauty; whilst the former constitute deformity, and produce the sentiment of dislike.

In animal bodies, a variety of circumstances have cooperated with curvature of superfice, and a moderate degree of yielding smoothness, in composing the sentiment raised by the perception of beauty. Symmetry of parts, and that complexion of skin, and expression of countenance, which indicate health, vivacity, and vigor, have been particularly efficient. And in the human system, all the attributes of beauty produce but a feeble sentimental effect, until they are reinforced by the influence of sexuality. The manner in which the visual perception of some of these co-operating circumstances, acquired its power of raising sentiments tributary to the emotion of beauty, shall be subsequently explained.

THE prospect of a beautiful landscape is the cause of much pleasurable feeling. to those who possess sensibility of soul. The origin of this intellectual feeling from sensual excitement, may easily be traced. A rural scene contains a great many objects, that produce pleasurable sensation in different organs. It contains—all the delicious varieties of fruit. which have so often gratified the sense of taste in early life; all the various flowers and other vegetable substances, which have frequently delighted the eye by the brilliancy of their colors, and the sense of smell by the fragrancy of their odors; the refreshing fountain, and the transparent rivulet, which have so deliciously quenched the ardor of thirst, and alleviated the fatigue of exertion; and the delightful temperature, and freshness of the air, which have commonly been experienced in such a situation. When all these objects of sensual pleasure are beheld in one prospect, they necessarily revive the sentiments they formerly produced, and blend them into one compound emotion, which will again be raised by association, when any similar landscape is surveyed.

A number of other circumstances assist in the formation of this sentiment, and tend to enhance it. Those who have been educated in the country, have all the pleasurable feelings experienced in their youthful pastimes, associated with their ideas of rural scenery. And the domestic animals and birds, found in such places, contribute to the pleasure excited; for we sympathise in their happiness, when displayed by their accents and their actions dictated by pleasurable sensation. The beauty of a landscape, also depends very much on those fundamental principles of beauty, in material objects, which have just been discussed. Thus, the beautiful curvatures of superfice in the earth, and a general suavity of appearance in all the objects of the scene, pre-eminently contribute to the elevation of the sentiment produced.

UNIFORMITY and variety, properly intermixed, are enumerated by all the writers on these subjects, as principal constituents in the beauties of nature and art. The pleasurable emotions they produce, are examples of sentiment proceeding in a direct manner from ideal excitement; and from those properties of our ideas too, novelty and familiarity, which are directly the reverse of each other.

Every ideal conception, which is either entirely new, or very different from that by which it was immediately preceded, affects the sensibility of the brain, and excites some degree of emotion, that is naturally pleasurable, but which is readily absorbed and lost, in the character of any other strong sentiment, revived by the same conception. Hence, when we survey a series of congenial and similar items in a landscape, if the intervention of dissimilar objects produce an extensive and sudden transition of ideas, it tends very much to enforce the sentiment, that was raised by the other beauties in the prospect. And if the intervening objects be singular and uncommon, their effect will be greater in proportion to the degree of their novelty. In many instances again, they combine with these properties, other powers to produce sentimental effects. Thus, a cataract, a precipice, or a mountain, not only diversifies the scene, and affects the mind by its novelty, but also has the power of producing the sentiment of sublimity—a sentiment which seems to admit of the following resolution.

In early life, a great many objects wear the aspect of greatness to the tiny organs of infancy, and easily overpower the imbecility of its nature. But whatever to the infant is great and uncontrolable, soon becomes the object of his fear, in consequence of the many unavoidable injuries inflicted upon him, by things which possess these properties in his estimation. The sentiment of fear, which thus becomes connected in the infant mind, with the ideas of greatness and irresistible power, is entirely free from the pollutions of hate and malevolence, which debase this sentiment, when excited by probable injuries from contemptible causes and malicious adversaries, with which we are able to contend. It is also modified and refined by other circumstances. We are dependent for many of our pleasures, on the successful exertion of our personal energies; in consequence of which, an abstract pleasurable feeling becomes connected in our minds, with the ideas of greatness and superior power. This feeling, in conjunction with our consciousness of safety, when beholding a sublime object, counteracts the painful qualities in the fear it inspires. Hence, in the riper years of manhood, the conception of an object that is really grand, before which we feel our littleness and imbecility, revives that kind of reverential fear, which constitutes the sentiment of sublimity.

THE sentimental effect, which accompanies the first conception of an idea, gradually diminishes in proportion as the idea becomes familiar; but the excess of familiarity again confers a similar power. The ease and energy with which we are able to conceive an idea, that has long been common in our thoughts; or to repeat a conception that has just been experienced without fatigue; produce a feeling of complacency, which is the radical ingredient, in the emotion raised by uniformity in the productions of nature and art. But this feeling is always very feeble, if not reinforced by an influence that is congenial. Regularity in a landscape soon becomes insipid, when it is not sufficiently enlivened by the intermixture of variety.

THAT symmetry of form, or proportion of parts which is so essential to the perfection of beauty, depends for its sentimental effects, and even its existence, upon these principles—upon the union of novelty with familiarity. In all the productions of nature and art, we find a great diversity of form and proportion. Every individual, compared with itself and its fellows, is too large, or too small, or is deformed in some of its parts. That one, which corresponds to the medium of all shapes and sizes, by coinciding with an extensive experience more nearly than any other, is necessarily conceived with greater ease and energy, and is therefore deemed the most symmetrical. At the same time, the occurrence of perfect symmetry is so rare, that it has all the effect of complete novelty. That these are the true sources of proportion, and of its sentimental influence, is proven by these facts; that we cannot judge the symmetry of an object, with whose species we are unacquainted; and that in objects in which symmetry is common, it ceases to affect us. But we must also observe, that there are traits in the form of some objects, which produce sentiments more energetic than mere symmetry, and which are therefore deemed beautiful, though inconsistent with that medium which is the essence of proportion. Thus a degree of erectness in the human figure, which is quite the extreme of nature, is admired as very beautiful; for being naturally connected with youth and activity, it raises the pleasurable feelings associated with the ideas of those qualities: and the sexual traits, which excite our social feelings, are generally most admired when they border on excess. So the lofty carriage of a horse is beautiful, though an extreme; because it recals the ideas of activity and spirit, with the pleasurable sentiments by which they are habitually accompanied. Hence our ideas of beautiful proportions, though principally dependent on the facility of conceiving the medium of all we have seen, are also liable to be modified by many other concurring circumstances.

For the pleasure we experience in hearing good music, a great many co-operating causes may be assigned. In the first place, the body of the sound employed is always intrinsically beautiful, or able to excite pleasurable feeling in a direct manner.

2. There are qualities in the perceptions of musical sounds, which sufficiently resemble the properties of softness and smoothness, perceived by the sense of touch, to suggest the ideas of those properties, and revive their associated pleasurable sentiments.

3. The movement of an air, which is either quick or slow, resembles the actions that are connected in nature, and thence associated in our minds, with feelings either solemn or gay; and therefore it imbues the sentiment excited with one of these qualities.

The beauties of melody and harmony, depend in a great degree, on uniformity and variety in the notes which compose them. Concords are naturally uniform, or similar to each other; while discords are intrinsically dissimilar. The attention must therefore pass, with ease pleasure, from one note to another in a chord of harmony; or the ear must perceive, with pleasurable facility, the harmoniously consecutive notes in a piece of melody. But the novelty of a discord must occasionally intervene, to raise and enliven the pleasure of harmonious uniformity.

5. The preceding cause may be more physiologically explained in the following manner. The seven original notes, which compose the gamut of music, excite in the organ of hearing, a circle of actions, similar to that which is excited in the retina by the seven primary colours. When one of these actions is produced, by resounding a note in the ear, it creates a disposition in this organ to continue in the same kind of action; and this disposition is gratified by reiterating the same note, or

others to which it is contiguous, until the excitability necessary to its perception, becomes fatigued and exhausted. The disposition to activity then shifts to the opposite side of the circle, where it is again gratified by resounding a corresponding note. By adapting, in this manner, the notes in the piece, to the predisposition created by them in the ear, their conception is constantly effected with pleasurable facility. But the excitability necessary to the common sentiment they produce, must presently become exhausted, and the sentiment of course subside, if the sentimental action be not occasionally varied and invigorated, by disappointing the predisposition in the organ through the introduction of a discord. The accented notes, recurring at regular intervals to mark the time, produce their effects in the same way, by creating a predisposition in the ear to hear them.

6. Music is commonly enjoyed in conjunction with other objects of pleasure; as feasting, dancing, poetry, and mirthful company. The passions and emotions raised by these, coalesce with the peculiar sentiments of the music, conferring upon them new attributes and energies, with which they will again be revived through association by the music alone. Any sentiments, which may thus be artificially connected with a particular piece, or species of music, will naturally become hereditary in the nation, in which that music is fashionable, being transmitted by sympathy from one generation to another.

Utility in the objects employed to promote the happiness of man; or the nice adaption of means to the accomplishment of an end; forms an item in the composition of beauty and contributes to the intellectual production of pleasurable sentiments.

The ultimate end in all the pursuits of mankind, is the procurement of pleasurable feelings. Whatever object has this tendency is eagerly pressed into their service; and that which proves the most succinct and certain mean to this end, is prized for its superior utility. But the object that is merely instrumental to the production of a sentiment, as well as its immediate cause, must become associated with it in the conceptions of the mind. And thus the abstract conception of utility, acquires the power of reviving an abstract kind of sentiment, possessing the general properties of pleasurable emotions. And this conception differs so little, from the mere idea of means adapted to the production of an end, that the latter, though the end contemplated be indifferent, is able by extemporary association, to revive the sentiment associated with the former.

The pleasures derived from the study of literature, are too numerous, and their causes too complicated, to be analysed for the purpose we have now in view. We shall only attempt to shew, that the emotions, caused by the beauties of language alone, are derivative and compound, and consequently referable in their origin to sensual excitement.

All the sentimental attributes of composition, may be comprised under the heads of usefulness and harmony. Under the head of utility must be ranked, all the properties of style, which contribute to the clear and forcible communication of our sentiments and ideas. Propriety, precision, perspicuity, with all the other qualities described by the critics, as necessary to the formation of a good style, possess neither merit nor beauty, independent of the aid they furnish to the effectual expression of our thoughts. They seem indeed to produce greater sentimental effects, than we commonly experience from the perception of utility alone; but these effects proceed principally from the ideas thus advantageously conveyed, and not from the instrument that conveys them. Merely as an instrument, language can have no merit but that of utility; and the sentimental influence of this property has been shewn to be derivative. But as an object of sense, language may possess other qualities, harmony in particular, which are capable of producing sentimental excitement. The harmony of prose has all the qualities of music in nearly equal degrees: the verse of poetry possesses the same qalities in greater perfection, particularly that of time. From these qualities, the harmony of style derives its sentimental influence, which is surprisingly great, being much superior to that of all the other properties of composition.

THE correctness of these remarks may be further confirmed, by a reference to the critics of China. The written languages of Europe merely represent the oral, to which they are entirely subservient. On the contrary, the written characters, employed by the Chinese literati, being arbitrary signs for ideas, not for words, constitute a language entirely independent of oral speech. Hence, while the classical writer of Europe, is employing his skill, to connect a series of significant sounds, that shall be agreeable to the ear; the scholar of China, with corresponding ambition, exerts his ingenuity to form a concatenation of marks, that shall appear beautiful to the eye, and at the same time, succinctly and forcibly convey the signified conception.

The compound sentiments, which are commonly termed passions, are raised, in general, by the conception of complicated ideas and events, in which intelligent beings are concerned. Their varieties and modifications, which have been noticed and named, are extremely numerous and indistinct. We shall only attempt to analyse those, which are most generic and distinguishable.

The most original and elementary form of passion, is that simple affection for its nurse and protector, which is generated very early in the infant mind. Its rise from sensation is easily traced. The imbecility of the infant, renders it dependent on its nurse, for safety from pain, and for all the pleasures it is able to enjoy. All its sensual gratifications that are most important, are visibly derived from this source ; whilst painful sensation is rarely excited, but frequently alleviated by the same agent. All the simple sentiments, derived from its pleasurable sensations, must consequently become connected, in the conceptions of its mind, with its idea of this person so instrumental in producing them : and being therefore equally revived by the recurrence of this idea, they must unavoidably become blended together in one sentiment indefinably agreeable. The perception of the nurse, or the remembrance of her idea, must hence very early exeite in the infant, a pleasing sentiment of attraction, constituting the most radical form of social affection. As it rises in age and understanding, and has its happiness promoted by a wider circle of friendly individuals, this affection is gradually extended, becoming associated with them respectively in proportion to the services they render. And when it has advanced so far, as to become an actor itself in the scenes of life, the new circumstances and relations which accrue to its social capacity, variously modify the further extension of this passion, constituting it friendship, benevolence, and love.

Its conversion into friendship may be explained in the following manner. Throughout the whole period of life, and particularly in infancy, when the sensibility of the system is acute, every voluntary action, or process of volition, produces in the acting parts, a peculiar sensation which characterises this kind of excitement. When the action is performed with force, the sensation is very lively and energetic, and when we conceive a strong voluntary effort, the corresponding sentiment is revived with distinctness and energy, constituting the animal nisus, or sentiment of exertion, which we formerly mentioned as the radical ingredient in the conception of power. As soon as the infant has learnt to perform some voluntary actions, and to sympathise in the feelings of a human being, he is led by various motives to employ those actions, in conjunction with his guardian, to procure pleasures, first for himself, presently for his nurturing protector, and finally for his playmates and relatives. By this voluntary co-operation with others, in procuring the objects of mutual pleasure, the simple affection which had previously been associated in his mind, with the ideas of their persons, becomes blended with the sentiment excited by his volition, and is thus converted into friendship. By conscious attention to the sentiment of friendship, we may be convinced, that it was originally produced in this manner; for we may thus discover, that it is not only a pleasurable feeling, introduced and enlivened by the conception of its object; but that it also has a trait of voluntarity in its composition, which would carry us into voluntary exertions to promote the happiness of its object.

By successively contracting new friendships, as we advance through the period of infancy, this sentiment becomes associated, not only with our ideas of various individual persons, but also with the abstract conception of those social qualities and personal merits, which produced in each instance the friendly predilection. Consequently if we now discover these valuable properties in a new acquaintance, we immediately become his friend to a moderate degree, without going through the rotine of experience, which was necessary to produce friendship at an earlier period. And when the conception of the social properties of human nature, and the sentiment of friendship, become fully abstracted, and firmly cemented together, we perceive in them the origin of universal BENEVOLENCE.

THE passion of love is a composition of sentiments, which vary in each individual case, with regard to their number and degrees of intensity. The sexual appetite, and the sentiment of friendship, are the only essential ingredients, without which it cannot possibly exist. But it is difficult to determine, what sentiment is next to these in importance, either for the constancy or the power of its operation: nor is it possible to enumerate the whole number, that may occasionally concur; for there is probably no pleasurable feeling in the composition of man, which does not in some case contribute to the formation of love. The emotion excited by personal beauty, and the passion of avarice, are very common, and are often conspicuously efficient. When a sufficient number of these constituent sentiments, are energetically excited by the same person, they necessarily coalesce together under the amalgamating influence of sentimental attention, and produce some form of the compound and variable sentiment of love.

An examination of the unsocial, malevolent passions, corresponding to the affections we have now discussed, may conclude the present investigation.

The innocent helplessness of an infant, excites the compassion, and secures the friendly conduct, of every person with whom it comes in contact; yet very early in life, many temporary pains are preferred for it, by the wisdom of friendship, with a view to secure distant benefits; and many unnecessary sufferings are inflicted upon it, by the carelessness of indifference. If the person, from whom these injuries are observed to proceed, does not counteract them by causing an overbalance of pleasurable sensation, their painful sentiments must naturally coalesce, and become associated with his idea, in the mind of the infant, and thus originate the sentiment of hate or DISLIKE.

A LARGER intellectual experience will presently abstract, in the conceptions of the infant, those antisocial properties of human nature which are the causes of mischief in society, and connect them in his mind with a general sentiment, possessing the common properties of the hatred they excited, when they occurred in individuals; and thus the abstract sentiment of MALEVOLENCE will be produced. The degree of its energy, and of its influence on the conduct of the individual, must correspond to the extent of the experience, by which it is generated and perfected, and to the susceptibility of his temperament for this kind of sentimental excitement. It rarely happens to any person, whose temperament is not peculiarly unkind, to undergo in society, an experience that will render his ideas of human depravity, and their associated sentiment of malevolence, more lively and influential, than his conception of our amiable attributes, and the benevolence they habitually excite.

IN the general struggle, to seize and enjoy the advantages of life, it frequently happens, that different persons pursue the same object. The success of one is then necessarily the disappointment and misfortune of the other, and must habitually excite in his mind, a sentiment of grief, corresponding to the nature of his miscarriage. By the repitition of such cases, the ideas of a rival and his success, unavoidably become associated in the conceptions of the unfortunate, with an abstract disagreeable sentiment, derived from the griefs he has suffered. This sentiment, during the continuance of the competition, is the passion of jealousy, and on its issue becomes envy. Persons who are unhappy in their temperaments, in their social intercourse, and in the prevalency of malevolent feelings, may have their envy so elevated as an habitual passion, that they will grieve at the success of others, when there is scarcely the shadow of rivalship. These sentiments of hate and malevolence, jealousy and envy, which we have now discussed, are in general deeply tinged with the qualities of anger, a passion whose origin is next to be explained.

The infant very early acquires such a range of voluntary action, and such a knowledge of causes and effects within the little sphere of his observation, as will enable him to take measures, and employ means, for the procurement of pleasure and the avoidance of pain. When he is threatened with injury from a trivial cause, that does not exceed his powers of opposition, he will consequently arrange and execute a plan of voluntary defence. If the evil be very imminent and probable, it naturally raises to the degree of fear, as we formerly explained, the painful sentiment produced from the sensation its occurrence would inflict; and his voluntary exertions to avert it, must be as vigorous and prompt as the danger is imminent. When the menacing object is an intelligent being, not simple fear, but a modification of hate, will be excited; and a greater degree of vigilance and activity will be required in the contest. Hence, very early in life, the mind will be inevitably placed in such a situation, that sentiments of hatred and fear, and the feeling produced by the efforts of volition, will be simultaneously introduced with the highest grade of energy. By the frequent recurrence of this situation, the sentiment of exertion must consequently be combined, with sentiments of hatred and fear, and by the combination originate the passion of anger.

By merely inspecting this passion, we may perceive, that it must have been produced in this manner. It contains the properties of hatred and fear, and strongly impels us to voluntary exertions, against the object that excites it: when the passion is intense, we even feel as if already exerting our powers on the obnoxious person, and are unable to refrain from muscular actions that mimic the combat. As it is a combination of fear, and hate, and the sentiment of exertion, which were all excited in great energy at the period of their coalescence, it must naturally become the most violent of our passions.

The causes of injury, to which the infant opposes an exertion of his voluntary powers, are both inanimate and sensitive, and are always comparatively trivial and impotent. The compound sentiment of anger, generated by his defensive exertions, must consequently become associated in his thoughts, with his conception of a menacing but resistible power, whether inanimate or intelligent. Hence this passion is excited in children, by dangers and injuries proceeding from insensible causes, as readily as by those which proceed from their intelligent companions.

As they advance in years, they become so well acquainted with the course of causation, in the inanimate objects of nature, that they are able to model their conduct in such a manner, and employ such precautionary measures, as to prevent the frequent occurrence of injuries from inanimate causes. And when they do accidentally occur, the operation of the injurious cause, either immediately ceases itself, or is quickly suspended by the dispassionate measures of reason. The actual production of anger by inanimate objects, becoming thus continually more unfrequent, their power to produce it must gradually decline as we advance to maturity. On the contrary, the relations of society, and the motives which actuate intelligent beings, are so complicated, that we cannot possibly avoid frequent injuries and causes of anger, in the intercourse of social transactions: and when an injury is inflicted, or designed by an intelligent being, the real or supposed continuance of his malevolent disposition, keeps us constantly on the alert, and prolongs the continuance of our anger. Hence the habitual power of the intelligent causes, to excite this passion, must continually become more confirmed and efficient.

Another cause, which is constantly strengthening the intelligent, and enfeebling the inanimate sources of anger, is the consideration of its utility in one case, and its folly in the other. The mischievous intentions of a sensitive being, are restrained by its fear of the anger they excite in its adversary; and we therefore cherish this passion for its service in such cases. But in every other instance, it merely affects us with pain and embarrassment, and is therefore solicitously discouraged. Yet there is scarcely any person, who can so effectually discipline his temper, and modify the association of this sentiment with his ideas, that any accidental and sudden injury will not revive a momentary glow of resentment.

Desire and aversion, hope and fear, joy and grief, are not themselves distinct and regular passions; they are only particular modifications and degrees of other sentiments. They are possessed however of specific and peculiar properties. Fear in particular is characterised by very distinguishing attributes. The highest degrees of action into which the human system is excited in early life, are generally of a painful description. When the recurrence of a great injury becomes again very imminent and probable, it must consequently revive with its sentiment of fear, a very high degree of general excitement.

Its ideal and sentimental conception in the sensory, occupies the whole attention of the mind, and produces the highest grade of sensorial activity. Excessive muscular excitement is at the same time indicated, by the palpitations of the heart, the tremors of the locomotive muscles, and the paleness of the skin produced by the contraction of the cutaneous blood vessels. Sometimes the conception of the danger is so energetic, that no other action can be excited in the sensory; and the power of deliberation and voluntary motion is therefore suspended. In other instances, the first spasm of exertion is so great, that a period of collapse, or syncope, immediately ensues from the exhaustion produced. And in common cases, if any mode of action occurs to the affrighted person, by which he may escape from the impending danger, all his energies are devoted to its performance ; and exertions are made, to which his strength in the ordinary excitement of the system is wholly inadequate. Hence, when the coward perceives, that his safety can only be secured by a victorious combat, he often fights with more energy than the man who is naturally brave.

THE imperfect analysis of passions and emotions, through which we have now progressed, appears sufficient to authorise this general inference ; that they are universally compositions of simple sentiments derived from sensation. It may seem perhaps, that the causes we have assigned for their production, do not satisfactorily explain their specific differences. On this point I would add these remarks. The specific characteristics of the different sentiments, for which we have assigned causes that are not materially different, are more ideal than sentimental. Every passion with the associated idea of its object, constitutes a complex conception of the mind ; and frequently these complex conceptions are very different in many respects, when they perfectly agree in their sentimental parts. And thus we are deluded into an opinion, that passions are essentially distinct, when they are only circumstantially different in their ideal adjuncts. Again, the principal difference between those passions and emotions, to which we have assigned similar sensual origins, consists in the superior liveliness and intensity of the former: properties which have evidently been produced by the influence of sympathy. Intelligent beings are generally concerned, in originating and reviving the passions; and when they are concerned in producing an intellectual effect, the power of sympathy coming into operation, reinforces the other causes and and greatly augments the result.

Having shewn in what manner the passions and emotions are naturally constructed from simple sentiments, and associated with ideas, by the common experience of infancy; we may conclude the present chapter by noticing, very briefly, the artificial modification of human sentiments in general by the powers of sympathy and conversation.

In the adult individual, we find every distinct and energetic sentiment, assosciated with particular modifications of countenance, and gestures of body, which constitute the language of nature. It is sufficient for our present purpose, to notice the existence and effects of this language, without investigating its origin. Dr. E. Darwin has very plausibly explained its artificial production in a variety of instances. It appears to us most probable, that it is instituted by common causes, operating on a predisposition in the excitable structure of the system. But from whatever source it may originate, the infant very early acquires and understands it. By frequently experiencing in himself, and observing in others, the connexion of these external signs with certain inward sentiments, they become so associated in his mind, that his perceptions of the former invariably revive the latter, with an energy corresponding to the extent of his personal experience.

A SIMILAR power is poſsessed by the artificial language composed of words. Children very early acquire sentimental terms, and associate them firmly with their principal sensations, simple sentiments, and passions. But the power of these terms to revive the sentiments they express, though very considerable, can never singly attain to the celerity and force, with which words may be made to revive our ideas, in consequence of the superior facility, which naturally belongs to ideal excitement.

BUT the natural, and the artificial language of passion, are generally combined to communicate our sentiments, in the common intercourse of society; and in conjunction they form a very powerful instrument, by which passion may be conveyed to the sensibility of youth, without any apparent diminution of its energy; and by which the most surprising effects may be produced, in the sentimental character of an individual. They are able, when properly managed, to elevate or depress any sentiment, to a degree very distant from the point to which it would be fixed by its natural causes. The parents and friendly companions of a child, for whom he entertains the most ardent and confidential affection, may even transfuse into his mind any sentiment they please, and associate it with any ideal conception, however remote, indifferent, or frivolous. For examples to confirm this assertion, we need not recur to the history of Egyptian superstition; they may be found in the annals of every age and nation.

The sentimental education of youth, should hence excite the deepest interest in every individual, and in every society of people. Nothing can be more important to me, than that my conception of every object should excite in my mind, the sentiment which accurately corresponds in mode and degree, to its intrinsic nature and its real value. I shall otherwise be frequently misled, and involved in infinite difficulties. The character of my conduct through life, is principally determined by the sentiments imbibed in my youth. Whether I shall be honest or villainous, malicious or humane, cowardly or brave, philosophic or superstitious; whether I shall be an ornament or a disgrace to human nature; is principally determined by the modification of my sentiments, and their association with my ideas, instituted by the sentimental discipline of early and domestic education.

To ensure the practice of virtue in every instance, it is absolutely necessary, that the highest degree of painful sentiment, should be associated with the ideas representing the commission of a crime; and that the most energetic grade of pleasurable sentiment, should be associated with the abstract conception of upright conduct. And this abstract conception of right, should be identified by habit, with all those general rules of morality, which have been sanctioned by the experience of civilised ages. The essence of virtue indeed, is the promotion of human happiness. Whatever mode of conduct has this tendency, is right, just, virtuous in the nature of things, without regard to the abstract principles of morality. Yet it is wholly unsafe, to make the production of happiness the only practical criterion of moral conduct. The insurmountable ignorance and imbecility of man, and the domineering vehemence of his passions, must continually expose him to great errors in making those complicated calculations, which are often necessary to ascertain the consequences of his ordinary conduct. The application of a precept is more simple, expeditious and infallible. It is therefore necessary, that we should habituate ourselves to the scrupulous observance of those precepts, which constitute the visible and permanent landmarks of morality. A grade of sentiment should be associated with them, which would compel obedience, even in those cases in which their infraction would evidently be highly advantageous, not only to ourselves but the whole society in which we live. We must *always* preserve the forms of virtue, or we shall *often* lose its substance.

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CHAPTER XI.

OF TEMPER, AND TEMPERAMENT.

> Some master passion in the human breast,
> Like Aaron's serpent, swallows up the rest. POPE.

IN common discourse, the word TEMPER, is employed to signify that passion, or mode of intellectual feeling, which for the present is most energetic, and excites the greatest influence on the conduct of the individual. I shall continue to employ it, according to this acceptation, to signify the most energetic sensation or sentiment, which is at any time experienced.

THE same term has generally been used to express, a permanent predisposition to some particular passion, or kind of sentimental excitement, which may commonly be discovered in every individual. For the expression of this fact, it will be more proper to employ the word TEMPERAMENT.

THERE is scarcely any minute in our waking, or dreaming hours, in which we cannot be conscious, that some particular sentiment predominates in the sensory, constituting the temper of the mind. It originates directly from stimulation pre-eminently strong; or is introduced by an association with some efficient idea; and is liable to be modified in some measure, by contemporary sensations and sentiments. Their modifying influence must be great, when it does not much exceed them in strength; but when excessively strong, they are either absorbed and lost in its magnitude, to which they contribute; or they prevail unnoticed in some remote corner of the sentimental department.

THE temper of the mind being radically derived from the stimulation of the senses, it is necessarily governed by the laws of sensual excitement. When any sentiment is rendered predominant, like the energetic action of an organ of sense, it has a tendency to continue when its cause is removed; and it may then be converted with facility, into other sentiments that are congenial. Thus when I am suddenly terrified with any imaginary danger, I continue to tremble for many minutes after I discover my error; and in this state, if any disagreeable idea recurs to my mind, the remains of my fear are converted into its peculiar sentiment and augment its energy.

WHEN I am elevated with joy at some prosperous event, my temper is readily converted into the congenial sentiments of love, generosity, and gratitude, if any object be presented which is calculated to promote the conversion. So the pleasant emotions excited by music, or a glass of wine, are easily modified, by any congenial object that may occur, into its own peculiar sentiment: thus in retirement, when the temper is mollified by "the concord of sweet sounds" the idea of mankind excites pre-eminent philanthropy, and we become enthusiastic in our wishes, and our imaginary schemes and projects for the promotion of their happiness: and in active life, the bravery of the soldier, marching to the onset, is increased by the congenial emotion of the "spirit stirring drum," and he thence steps up more firmly, to receive his doom at the cannon's mouth.

THE temper of the mind, not only changes its character with facility, into that which is congenial; but it is readily induced to librate, or to assume a character directly the reverse of that which has just prevailed. After the perception of red, we can perceive the colour green with peculiar felicity; so when any strong passion, as anger, has prevailed a short time, on the removal of its cause, the contrary sentiments of cordiality and love may be induced with peculiar ease and delight. In matrimony a momentary strife just serves to season its social felicities.

THROUGH the whole routine of sentiment this law of excitement is evident. Mirth predisposes to melancholy, anger to cordiality, and hope to despondence. The mere removal of pain is succeeded by pleasure: in this case some metaphysicians would persuade me, that I am deceived by my feelings; that I am not positively happy, but only imagine that I am, because I was previously miserable. This opinion they advance contradicts both fact and analogy. When the painful sensation is removed, the ordinary causes of pleasurable sentiment excite a libration of temper, and I become positively happy.

As in sensual excitement, so in the temper of the mind, this libration may supervene without the agency of any external cause. The abuse of religion affords an example. When a man, who has a weak understanding and an enthusiastic temperament, and who has consequently been subject to irregularities of conduct, seriously attends to the declamation of a popular preacher, announcing the torments of hell as the reward of human wickedness and depravity, his fears become extravagantly raised by the tremendous account. He retires in agony and despondence. The thoughts of his sin and its hellish consequences incessantly infest his imagination. In vain he solicits remission and favor. Satanic spirits and heavenly denunciations continually torment him in the visions of the night, and in the reveries of the day. Sentences from holy writ. threatening and pacific, ring alternate in his ears. His powers of dismal sensation at length become exhausted, and he verges to the indifference of despair. At this juncture as he again solicits the mercy of heaven, he suddenly experiences a libration of sentiment; from the horrors of hell he is suddenly transported to the extacies of heaven; and from this happy moment he dates the signature of his salvation! How weak is humanity! how many enthusiastic mortals have mistaken the natural fluctuations of sentimental excitement, for the inspiration of heaven!

But even this physical process is an imperfect regeneration. The supposed convert perseveres in his new sentiments, till he renders them habitual; but not without occasional relapses into melancholy, darkness and vice.

THIS account of fanatic conversion, which I have copied from the general tenor of the experiences related by such converts, is conformable to that law of excitement, which determines the retina spontaneously to perceive the color green, when greatly fatigued by the perception of red. When a youth I once experienced in myself a similar libration of temper, so sudden, so distinct, and so forcible, that had it been caused by religious reflections, I have no doubt that I should have believed it to be the act of regeneration.

THE predominating sentiment is commonly introduced and modified by its association with our ideas and perceptions; but conversely it sometimes introduces our ideas, and generally rules the current of our thoughts and actions. It rarely happens in our waking hours, that any sentiment is excited with energy, before the idea of its object is present in the mind; but when such an event does occur, it naturally revives by association, all the ideas relating to its cause.

IN sleep, when a sensation is strongly excited in the system, it revives the ideas that are associated with it, or congenial to its nature, constituting our dreams. Thus when we experience any disagreeable sensation in sleep, we dream of quarrels, difficulties, and dangers; robbers, fires, and precipices; or whatever object may have previously produced a similar sentiment. When the sensation is pleasurable, other objects congenial to its nature recur to the imagination.

BY the peculiar extemporary association of resemblance, every passion revives all the ideas which have any similarity to its object; or which excite sentiments similar to itself. Thus when any person provokes my anger by improper conduct to me, this passion recals to my mind, all his odious conduct on other occasions; the imperfections of his person and character; the meanness of his connexions; the poverty of his fortune; and every other circumstance which can be an object of dishonor and aversion.

The natural permanency of sentiment, is a quality pre-eminently important in the operations of the mind. Our ideas occur and vanish in an instant: others equally fleeting succeed them. Their various natural and artificial associations with each other, may preserve some degree of order and consistency in their succession in the mind; and incidental stimulation may confine them to the concerns of the person by whom they are conceived: yet without the restraining influence of temper, we should experience such volatility and unsteadiness of thought, that no grand design, no important enterprise, could ever be accomplished. As soon as an object of worth was conceived, or a project designed, our ideas would wander from it indefinitely, under the direction of stimulants and association, if the more permanent sentiment, or temper it institutes, did not restrain them by its superior power. When my curiosity for example, is excited to investigate the truth or falshood of any proposition, the permanency of that sentiment confines my volatile ideas to the question by which it was raised, until the accomplishment of my purpose, destroys at once the object and its sentiment by fruition.

STRENGTH of mind, or intellectual superiority, appears to be produced, by the perfection of sensibility in the sentimental department, more than by any excellence in those regions, which are particularly appropriated to the operations of the understanding. There is probably no example of intellectual greatness, in which the superiority is not indicated, and apparently produced, by uncommon energy, permanence, or delicacy of sentiment. A genius for scientific invention, is particularly dependent on strength and constancy of temper. These properties in the predominating sentiment, direct, confine, and perpetuate upon its proper object, the whole attention of the ideal departments in the sensory, and invigorate their conceptions to the degree of accuracy and completeness. Within the narrow limits of my own observation, the minds of all those persons, who are conspicuous for their ingenuity and invention, are distinguished by the possession of these sentimental traits. The records of biography can furnish innumerable facts of a similar description. The minds of Newton and Rosseau were remarkable examples for strength and tenacity of sentimental action. Newton has said, and doubtless with propriety, that his intellectual faculties were not uncommonly great; and that his success in science proceeded from his patience of investigation, the original darkness and obscurity of new subjects yielding only to his perseverance and industry. The chief excellence of his mind, has consequently consisted in the obstinacy of his curiosity, or the permanence of his temper. If the author of this volume has attained to any degree of mental pre-eminence, he must acknowledge that he owes it to the same properties in his sentimental excitement.

A GENIUS for wit and eloquence, and for the execution of grand projects in active life, requires properties of temper somewhat different from the former. The quickness and versatility of thought, which are necessary in these pursuits, are inconsistent with that pertinacity of sentiment, which is so essential to solid judgment and profundity of invention. But they require an equal energy of temper, and are much facilitated by delicacy and promptitude of sentimental action. To produce a philosophical genius, it is necessary that the temper should be strong and permanent, that it may be able to concentrate all the ideal actions of the sensory on the topic to be investigated: to produce a general, or an orator, it is necessary that the predominating sentiment should likewise be energetic, but so variable as to admit a copious train of ideas, or a quick and distant transition of thought. These properties of sentimental action, its intensity, permanence, and delicacy, are dependent on the temperament of the sensory.

THE predominant sentiment is the source of our actions. We can pursue no train of ideas, nor any plan of conduct, to which we are not incited by the hope of attaining some object. Sentiment is the radical incentive to all voluntary exertion; and that which is pre-eminently strong, which constitutes the temper of the mind, must naturally possess the greatest weight and influence in our determinations.

When any interesting object occurs to our thoughts, which may be seized and enjoyed, but not instantaneously; it raises in the sentimental department a predominating action which enforces its pursuit. During the progress of our voluntary exertions to obtain it, a variety of little incidents will occur to divert our attention; or various intermediate purposes will require to be accomplished, as preliminaries to the completion of the principal pursuit. These when sufficiently urgent, will produce modifications of the prevailing temper; or they will raise distinct predominating sentiments of their own, which will govern our conduct for a moment, and then resign us to the dominion of our previous temper. A facility in receiving these intervening sentiments, and modifications of temper, and in resuming again the original mode of action, constitutes that variability of temper, which is necessary to the general in fighting a battle, and to the orator in delivering his oration.

In all the human species who possess the common senses, we discover corresponding elementary ideas; but in the artificial modifications of these ideas, we find an infinite diversity in different persons. With respect to elementary sentiments, and distinct passions, there is an equal uniformity; and it continues in a great degree unchanged by the interposition of art. Sentiments are naturally incapable of such extensive abstraction and composition, as we practise with facility on our ideas. Yet men are as much diversified by their sentiments, as they are by their knowledge. In the association of sentiments with ideas, each individual, and each nation of people, has many peculiarities: a mysterious notion in theology, which habitually excites the most profound reverence in one person, produces only contempt and laughter in another.

But the most obvious diversity of human sentiment, is that which is caused by the temperament, or the permanent predisposition of the sensory to the predominance of some particular mode of sentimental action. Thus in one person, we may discover a predominance of the angry and selfish passions; and in another, a general prevalence of benevolent sentiments: some we find naturally melancholic and peevish; whilst others are constantly cheerful and gay.

The temperament of the sensory may have two sources; it may either be habitual, or the offspring of nature. Thus, if any person be placed in such circumstances, as to be constantly exposed to the production of any particular kind of sentiment, it is impossible, according to the general laws of excitement, that it shall not become more familiar and excitable, than any other mode of sentimental action, and thus produce an habitual tendency to its repetition. Consequently the temperament of every individual, must be modified by the circumstances of his situation.

A natural temperament depends on some peculiarity of excitable structure, in the organs of sensation, and their corresponding portion of the sensory. Probably the intrinsic condition of the stomach, is more efficient in this case, than that of any other part. It appears to be a principal source of sentimental excitement. It furnishes at least the substance and energy of our sentiments; and in hypochondriac and delicate persons, its occasional affections exert an omnipotent influence, on the temper of the mind, and the enjoyment of life.

As temperament depends on the state of excitability, and on the habits of action, in the organs of sensation and sentiment, it must necessarily be subject to continual fluctuation. The varying transactions of human life, are every day insensibly changing the habits of every individual; and various physical agents, are hourly producing revolutions in the general sensibility of the system, by modifying the state of its excitable structure. The physical progress of the body, from the tender informal condition of infancy, to the rigidity and decripitude of age, produces a more slow but certain and extensive revolution of temperament.

It has sometimes been gravely enquired, whether mankind enjoy more happiness or misery. The greater prevalency of pleasurable sentiments, appears to me extremely evident. The whole business of life consists in the pursuit of pleasure and the avoidance of pain. We meet, indeed, with many difficulties, dissapointments, and misfortunes; perhaps we as often accomplish the possession of evil, as of good; but we must recollect, that the greater part of our sentiments proceed, not from the enjoyment of the object, but from their association with its idea. We are continually pursuing some probable, or contemplating some abstract good, which imperfectly produces, by association, the pleasurable sentiment its enjoyment would excite, constituting according to its degree either hope or desire. The sensations excited by enjoyment, are often too violent to be sustained by the human constitution; their revival by association, in the sentimental forms of desire and hope, afford us pleasures more rational and permanent.

INDEPENDENT of those specious objects of happiness, which are so eagerly pursued by all mankind, and so prolific of pleasure to the pursuer; it is highly probable, that the general temperament of humanity, excited by the common stimulants of life, is alone sufficient to secure a predominance of pleasurable feelings, and is actually the principal source of all the happiness we enjoy. Temperament and common stimulation, are apparently more efficient in the various circumstances of life, than those circumstances themselves. The slave, the citizen, the savage, and the gentleman, seem to enjoy, if not an equal degree, yet an equal overbalance of pleasurable sentiments. The permanent circumstances in every situation of life, soon become familiar, and cease to produce any great sentimental effect, or to modify the general tenor of sensation. Those objects and motives only, which rise above, or fall below the common standard of our condition, are able to elevate or depress our feelings; and the good fortune of one situation, is not less probable than that of any other.

THAT temperament alone is sufficent to ensure the happiness of man; and that it is actually the principal source of the happiness, or the misery, enjoyed in every condition of life: is however not likely to become the popular opinion on this subject. An ordinary observer rarely feels either an elevation or depression of spirits, without being ready to assign some ostensible cause for its production; but very generally the assignment is erroneous: it is, almost in every instance, some mental consideration; some object that operates on the temper through the medium of ideal conceptions. The direct influence of common physical agents, to create a predisposition in the nerves, and to excite it into sensation, is rarely suspected for producing a revolution of sentiment.

When the temper of any person becomes uncommonly cheerful, or depressed, from the agency of constitutional and physical causes; it immediately suggests to his mind by congeniality of excitement and association, all the ideas representing the most agreeable, or unpleasant circumstances of his situation. These circumstances are thence naturally praised or blamed for the sentiment experienced. When a damp cloudy day, or a fit of indigestion, oppresses the hypochondriac, or the valetudinarian, with melancholy feelings; the ideas of his real and probable misfortunes, the ills of this life and the terrors of the next, are incessantly suggested to his mind; and to them he attributes all the misery he feels. But suppose he eats a light supper, sleeps soundly through the night, and finds a clear sky and a dry atmosphere in the morning; his feelings of course become cheerful, and direct his ideal attention to the objects of pleasure and hope; the ideas of misfortune are disregarded and forgotten; and if his happiness now becomes an object of reflection, he readily attributes it to some present or anticipated good fortune, which was equally present in his hours of melancholy. Thus the generality of mankind, are constantly under a natural delusion, with respect to the principal causes of their feelings, always attributing them to the considerations, events, and pursuits, which they merely suggest by association.

CHAPTER XII.

CONCERNING BELIEF.

WE shall proceed in the present chapter, to investigate the nature of belief in its greatest latitude. The subject is abstruse, and highly interesting. Its depth and subtilty may be inferred, from the obscurity in which it is yet involved. It seems in general to have eluded the attention of metaphysicians; for in their writings they have rarely made it a primary and distinct topic of discussion. And in those instances in which they have noticed it, either in a direct or an incidental manner, we find in them nothing satisfactory and conclusive. The principles of demonstrative logic, and the just measures of probability, have indeed been amply and ably developed; but the metaphysical philosopher, satisfied with this progress, has improperly stopped, on surveying the rational grounds of conviction, without sufficiently investigating the intrinsic nature of the conviction itself, which they produce. Until the enquiry is completed to this extent, neither speculative curiosity can be gratified, nor practical utility secured.

The importance of the subject, must be obvious to those, who reflect, that truth and belief are practically synonimous; and that a knowledge of the truth, respecting all the objects of human pursuit, is indispensible to the command of all the benefits they may afford. Even in matters completely speculative, this topic is interesting. The real and imaginary importance of faith and opinion, upon the doubtful points in morality, politics, and religion, has in all ages filled the world with civil and military contentions. Various little questions of belief incessantly rise and agitate domestic life. Others, with more gigantic power, inflame whole nations to that degree, that even civil and foreign wars ensue.

In the prosecution of this enquiry, I shall first examine the nature of belief analytically; I shall then draw an induction from its regular phenomina; and lastly I shall consider its anomalous appearances, and correlative topics. The present chapter will be devoted to its analytic investigation.

In the ideal conceptions of the mind, we are conscious of a singular and interesting diversity. They sometimes seem to glide very calmly through the sensory, scarcely exciting any attention, or even producing the customary ideal and sentimental effects by their established associations. In other instances, and under different circumstances, the same ideas become more substantial and weighty, and exert a peculiar and important influence on the intellectual transactions. It may be difficult to define, or describe by words, this difference in the conception of our ideas; but every sound mind apprehends it with the utmost ease and certainty, and terms that quality belief, which characterises the more interesting and influential conception. This knowledge it acquires by contemplation in the manner of consciousness. And although it thus apprehends the reality of the difference, with certainty and ease; yet there is probably no article of intellectual information thus acquired, which has less precision and definitude. When we attempt to explore the nature of belief, we are surprised, that a mental fact, which so incessantly recurs and excites our attention, should possess so much obscurity, and be so difficultly subjected to scientific investigation.

CONTEMPLATING it by the method of consciousness, we can only discover that it exists, and that its attributes are sentimental. When my fancy represents to me, that my absent friend is dead, I can form a very clear and complete idea of that event; but I can attain to nothing more than a mere inconsequential idea; I cannot possibly believe it. But when a messenger of undoubted veracity arrives, and affirms 'your friend is dead' I instantly believe and mourn: yet my idea of the dissolution of my friend remains apparently unchanged; it is now precisely what it was when fancy formed it; I can discover no ideal variation—but I am conscious of a sentimental change. I am conscious, that in the instant when the imaginative idea is changed into belief, it exerts an influence on my affections and modifies my temper. So when I am curiously intent on the investigation of some abstract proposition, the instant that I perceive its truth, I am conscious that I *feel* a sentimental change, accompanying the commencement of belief: and this sentimental effect is the only attribute of conviction, which consciousness can discover.

The external effects of belief on the actions of the individual, are more conspicuous and easy to be determined than its immediate character. It possesses a powerful influence on all the voluntary actions of mankind. No plan of conduct can be formed, no action or enterprise conceived and prosecuted, without some degree of faith in the facts, the principles, and the consequences which it involves. Whilst I merely fancied that my friend was dead, it had no influence on my conduct; but no sooner is that fancy converted to belief, than my voluntary actions receive a new direction; I deliberate at least, whether something may or ought not to be performed, in consequence of this event. So when I have discovered the truth of some abstract proposition, it no longer continues indifferent and inconsequential, but becomes a principle of action, and rules my conduct in every case in which it is concerned.

This modification of our conduct by belief, is conformable to its sentimental properties, or influence on the temper of the mind, discovered by consciousness; for predominating passion is an immediate and essential prerequisite of voluntary exertion. We may plan the most brilliant and noble enterprise, for the attainment of some grand object, and firmly believe in its easy execution and its certain success; yet if that object excite no desire, nor in any degree affect the ruling sentiment of the soul, we shall certainly not proceed in its pursuit. Conviction must modify the temper, and raise an intensity of passion, sufficiently great to impel us into action. What quality then, in our ideal conceptions, constituting belief, can produce these effects, which are inwardly felt by consciousness, and perceived in our conduct by the external senses?

We have already affirmed, on the authority of conscious inspection, that it is not anything discoverable directly in our conceptions themselves; not any integral modification, or logical arrangement of our ideas; and this affirmation may be further confirmed by the reflections of reason. It can neither consist, in any peculiar mode of combination in the elementary ideas of the proposition believed; nor in any peculiar, authoritative, or credential idea annexed to them: for the imagination, or the voluntary power of the mind, has such unlimited command of its ideas, that it could produce any specific arrangement in the elementary parts of a conception, which might be necessary to excite belief; or it could annex any particular authoritative idea, which might be able to produce that effect; and we should consequently be able to believe what we pleased. As it respects any matter of fact; it is evident, that the imagination can delineate any event whatever, with all the attributes of reality. It can form an idea of any possible occurrence, with more minuteness and precision of circumstances, and with more conformity to personal experience, than is to be found in any historical fact that we firmly believe;

yet it can effect no combination of historical ideas, that shall be intrinsically able to produce conviction. The testimony of a credible witness, or of our own senses, produces this effect without adding any particular item to the imaginative conception, or altering in any manner its intrinsic composition.

IN abstract propositions it is equally certain, that belief does not proceed from any intrinsic ideal property, discovered in them by the mind; nor from their connection with any common credential idea. That the square of the hypothenuse is equal to the squares of the other sides, is a proposition which I can clearly conceive and understand, as soon as I hear it; but I cannot believe it true, until I have seen it demonstrated, or have heard testimony in its favor. Yet neither its demonstration, nor moral proof, consists or terminates in modifying its component parts, or adding to their number, as they appeared on its first conception. Consequently belief is not excited, by the intrinsic mode of combination in the ideas believed; nor by their association with any particular authoritative idea.

NEITHER does it consist in the production of any specific unalterable sentiment. The mind possesses less voluntary power over its sentiments than its ideas; yet it can readily combine them together, or associate them with its ideas, when there is any congeniality between them. If the occurrence of belief, as some metaphysicians have maintained, was invariably accompanied by the same specific sentiment; it is impossible that the mind should not become able to conceive that sentiment with precision and certainty, and to associate it with any proposition, with which it is capable of an alliance, and consequently to believe at once, any thing susceptible of belief. The mind has indeed apparently unlimited power, in combining and modifying its ideas and sentiments; but it can never by this power alone, attain to the belief of any fiction or unproven proposition.

The sentimental effect, which is characteristic of belief, is not therefore any specific unvarying sentiment; but is simply a more forcible revival of that sentiment, which the ideal conception naturally tends to produce. We can scarcely form any combination of ideas, whether relative to real existence, or to the abstract nature of things, which will not excite some kind of sentimental action; either directly, as in the perception of musical sounds and brilliant colors; or indirectly by previous association, as in the apprehension of a probable injury that has formerly been experienced. The feeling, of which we become conscious in the commencement of belief, is merely a stronger degree of this sentiment, than the imaginative conception could produce. Thus, when I merely imagine the death of my friend, the idea is unpleasant; it excites some uneasiness; and when I am induced to believe, that this event has really occurred, the sentimental effect I experience, is merely an augmentation of this simple uneasiness, to that degree which is denominated grief. Hence conviction modifies the temper or changes the predominating sentiment, and governs our voluntary actions.

Having thus discovered by conscious inspection, and established by argument, that there is no essential property in our ideas and sentiments, or in the manner of their combination together, which enables them to produce these evident effects of belief; we must conclude, that the whole depends on the MANNER of their conception. Excluded from those intrinsic properties of our ideas, which are permanent and essential, we can imagine no source, but the variable mode of their conception, from which belief and its effects could be derived. Nor can we discover in the manner of an ideal conception, any qualities but those of perspicuity and force, whose variations could exert any influence on the convictions of the mind.

These two qualities are materially different from each other; for we may have a confused indefinite conception of an object, yet the action constituting that conception may be strong; and on the contrary we may have a clear and precise idea, where the action is weak. A certain degree of force seems necessary to perspicuity; that which is either greater or less produces some degree of confusion. Thus when we see objects by the ordinary light of the sun, we see them clearly; when we examine them by moonshine, our perceptions are obscure from defect of excitement; and when we behold them in a clear day covered with snow. our conceptions become indefinite and painful through excess of exertion. The energy of conception invariably corresponds, to the quantum of stimulus and the perfection of the excitability; its perspicuity is produced, by the distinct and precise application of a moderate stimulus. The ideas of a sound mind, which are copied from clear perceptions, are never obscure from excess, but frequently from defect of energy. We are at all times conscious of the variations, which may occur in our ideas, with respect to perspicuity; but we rarely become sensible of their variations in force. The very manifest difference between our ideas and perceptions, as apprehended by consciousness, consists principally in perspicuity.

It is extremely evident, that the manner of conception, which constitutes belief, has no connexion with perspicuity. The ideas which constitute an interesting and consistent fiction of imagination, are often conceived with the utmost perspicuity and precision, to which the human mind can attain, without any perceptible tendency to belief; whilst the recollection of some historical event, which we believe with the firmest assurance, is entirely indefinite and obscure. We may feel absolutely certain, that an object seen at a distance in a misty air, is a human being; though our perception of it be less distinct, than our imagination of a man above the clouds, to which we give not the least assent. The credential mode of conception, must consequently consist in the remaining quality of force alone; or in something that must elude our scrutiny on the present occasion.

We have proven, that belief does not depend, on any intrinsic constituent property in our ideas and sentiments, or the manner of their combination together; nor on the perspicuity of their conception. We shall now attempt to prove, that energy of conception, their only remaining quality, essentially constitutes its foundation.

THE only sensible property, or immediate effect of belief, consists in a higher grade of feeling, sentiment, or passion, than the imaginative conception could excite. And it is through the medium of this effect, that it exerts its influence on our voluntary actions, and produces its remoter consequences. If therefore we can prove, that energy of ideal conception must necessarily produce this effect, we shall prove, that it is the source and the substance of belief.

THAT the intensity of the sentiment, must correspond to the force of the ideal conception, from which it proceeds, by unity of excitement as a natural, or by association as an habitual effect; is a position extremely plausible, and capable of proof by direct analogy and experiment. An association is an artificial stimulus, or diffusion of the effects of physical stimulation. The excitement it causes, like the action proceeding directly from a physical agent, must be energetic in proportion to the force of the antecedent or causative motion, and the perfection of the excitability. When the introductory article in a tribe or train of motion, is excited with preternatural force, it is contrary to all analogy and experience to suppose, that the consequent actions, which are its effects, will not be revived with proportionate energy.

THE only considerable difference in energy, which is manifest to the mind in its ideal conceptions, is that which occurs between a perception and its correspondent idea. It is universally evident, that an idea has less vivacity and force, than the perception from which it originally sprung; and all its ideal and sentimental effects are proportionably feeble. All those combinations of ideas, which are capable of producing sentiments, are vastly more efficient when perceived, than when they are merely imagined. When I revolve in imagination some elegant tune, or contemplate the image of a beautiful virgin, I feel a very feeble emotion; but when the tune is played to me, or the lady is presented to my sight and feeling, I immediately am enraptured; merely because perception is stronger than the ideas that have originated from it, and excites proportionally stronger sentimental effects. When I think with an empty stomach on delicious viands, of which I have formerly eaten, the idea by association excites the desire of eating them again; but if they be actually perceived by the senses of smell seeing, the perception will excite a much higher grade of appetite. The idea of falling down a precipice, becomes associated by experience with a painful emotion; the imagination of such an event is consequently painful, but it never excites that degree of horror, which is produced merely by approaching the fearful brink.

Where the association is triple, or there is an intermediate idea, between the primary conception and the ultimate sentiment; a variation of force produces the same effect, but not so efficiently. Thus, when my friend has been long absent from me, I may recollect the ideas of his person and character with precision and vivacity, without producing a strong revival of the associated sentiments of friendship, which were formerly excited by his presence; and I may recollect his near kinsman, his intimate companion, or something which I have known long in his possession, without experiencing any alteration in my feelings; but if I meet with any of these objects, the actual perception of it, will enforce by association, the idea of my friend, and strongly revive the delicious and forgotten sensations of cordiality. The perception of his picture, by another kind of triple association, will produce similar effects; although the mere idea of it, will not make the least impression.

It is unnecessary to multiply examples. This proposition is already established—that energy in an ideal conception, communicates proportional intensity to its natural and associated sentiments. This quality of our conceptions alone, is therefore capable of producing the sentimental effects, which form the attributes of belief, and the medium of its consequences. Hence, when a fiction of the fancy is converted to belief, nothing but the mode of its conception is changed; it acquires greater energy, by which it is enabled to influence the excitement of the mind, to modify the temper, and to regulate the voluntary actions.

The degree of energy which is necessary to constitute belief, is not positive; it is greater and less according to the general tone of mental activity. Although each action in the system, compared with its contemporaries, is possessed of strength in proportion to the quantity of stimulus exciting it, and the perfection of excitability in the organ that performs it; yet by unity of excitement, all contemporary actions mutually invigorate each other, and rise above the powers of their individual causes. Consequently when the mind is highly excited, the incredible fictions of the imagination, or the actions that are the most feebly excited, may attain to greater energy, than the most positive conviction will possess in a state of debility and relaxation. To produce belief, it is therefore only necessary, that the conception should be relatively strong; that it should in energy exceed the grade of its contradictory and discordant rivals. This is all that is necessary to enable it to produce the effects, which are characteristic of conviction. The idea that is excited with sufficient energy, to prevail over the weak rivals with which it is inconsistent, must necessarily introduce its own peculiar sentiment and modify the temper of the mind.

Belief is therefore the same with respect to ideas, that temper is to sentiments. The most energetic, or predominant emotion of the mind, constitutes its temper: so the most energetic ideal conception constitutes its belief. And these two principles must necessarily be congenial: for they mutually introduce, corroborate, and modify each other; and in conjunction they are the entire source and directors of all our voluntary conduct. As the predominating sentiment does not absolutely exclude all others from the mind, but admits the coexistence of those which are congenial; so the predominant idea, or superior conviction, is not a solitary tyrant, but tolerates the presence and belief of other propositions, with which it is consistent or associated. Belief may hence be defined to be—the predominating ideal conception, with all its associates present in the mind.

To explain more completely the degree of energy which is necessary to command assent, we may observe, that the subjects of belief are universally complex conceptions: in general they are propositional ideas; though we sometimes tacitly believe our primitive and abstract ideas, and very commonly our perceptions, without conceiving them in the propositional manner. To produce belief in one of these complex conceptions, it is only necessary, that we should be able to conceive its particular combination of constituent parts, with more energy than we can conceive any other contradictory and opposite combination of the same elements—that we should be able to conceive a given, affirmative, mode of combination, more forcibly than we can conceive any conflicting mode, or negative combination of the same ideas. Hence, the strength of association in a complex idea, may be viewed as coefficient, and even synonymous, with force of conception in producing belief. They are always equivalent to each other, and are in reality identical; for the connective excitement between the component items, is a part, and often the principal part of the complex conception.

The preponderance of any mode of combination, over others that are contradictory, must considerably depend on the ideas, which at the same instant predominate in the mind. Ideas which are associated, or in common language consistent, mutually communicate their energy to each other. When therefore any conception is excited with the force of unlimited assurance, which is connected to the affirmative side of a given question, it communicates its energy to that affirmative, and we thence inevitably believe it. Under the predominance of other ideas, with which this affirmation is not associated or consistent, we should probably hesitate concerning its truth, or positively renounce it.

As belief depends entirely on the greater degree of energy, with which we conceive a given combination of ideas, than any other which contradicts it; and as this preponderance of strength must vary from the slightest superiority, to the greatest amount of which excitement is capable; we should expect to find in our ideal conceptions, a corresponding gradation of belief. The least enquiry concerning such a fact, will satisfy us of its existence. The mind is conscious of giving a regular gradation of assent to its ideas, from mere possibility, through all the degrees of likelihood, to the most indubitable certainty. Throughout this gradation, the higher degree of assent constantly excites a higher grade of sentiment, and exerts a greater influence on the transactions of the mind. Thus the mere conception, or possibility of some good event, raises a gentle grade of emotion or desire; the probability of its attainment produces the higher degree of hope; and the certainty of its completion excites joy.

HAVING thus finished the analytic investigation of belief, we may proceed in the next place, to draw an induction from its regular appearances. If we can thus ascertain, that in every regular case of belief, there is necessarily more energy of conception, than any imaginative or contradictory proposition can attain; and that in every instance, the degree of energy corresponds correctly to the grade of assurance experienced; we shall think that our theory is thus more completely established.

CHAPTER XIII.

THE SAME SUBJECT CONTINUED.

PRELIMINARY to the topics to be discussed in this chapter, it will be proper to recapitulate certain principles, that have already been delivered and repeatedly confirmed. We must recollect, that there are but two general causes, by which excitement can be produced; the action of a stimulus; and the agency of association: that in every particular instance of association, the force of the secondary, or associated motion, corresponds to that of the antecedent which excites it: and that all cotemporary actions, proceeding from either source, mutually enforce each other by unity of excitement. We should also recollect, that associations are universally firm and efficient, in proportion to the earliness and the strength of their first establishment, and the frequency of their unmixed repetition.

I. **TRUTH** is the natural and universal object of human faith. In common language, truth and belief are nearly convertible terms; the latter simply expressing the apprehension of the former by the human mind. That which is perceived to be true, is unavoidably believed; and whatever is believed, is necessarily true to the individual who believes it. He has no internal and immediate standard of truth, but his present conviction. The variations of this conviction however in different persons, and in the same person at different times, compel us to abandon this instinctive standard for another exterior and infallible, to which when perceived the internal invariably conforms. This exterior and natural criterion must here be developed.

An universal and unexceptionable definition of truth, may be expressed in very few words; it is the conformity of our ideas to nature. All our knowledge consists in ideas, which represent external things, the realities of nature: when the representation is just, is conformable to the realities represented, we affirm it to be true; and when it is not just and conformable, we declare it false. This conformity is therefore the essential and infallible criterion of truth. An elementary, or an individual idea, is declared to be true, when it is such an action of the sensory, as the external object does naturally excite in a sound mind. But when we speak of truth, we commonly refer to those complicated combinations of ideas, which have not received individual names, but are usually expressed in propositions: and that combination, which is conformable to the natural union of sensible properties, and distinguishable objects in nature, is denominated truth.

In matters of fact, it is very evident, that the truth of our conceptions, depends on their comprising combinations of ideas, conformable to the real conjuncture of the objects they represent, or the natural concourse of real events. When I conceive, that Lexington is composed of houses formed of wood, brick, and stone, and arranged in a certain order, my conception is true; for it is conformable to reality: but when I interpose in this complex idea, a number of marble palaces, it becomes false; for it is then contrary to matter of fact. If I affirm, that in November 1807 I was in New-Orleans, and in the same month in New-York and Philadelphia, I declare the truth; for I express ideas conformable to real events: but when I add, that in the same month I was also in London, I deviate from the real course of things, and therefore utter a falshood.

A little reflection renders it equally clear, that this conformity is also the infallible standard of general truth. The truths which occur in the abstract sciences are of two kinds; they consist simply in certain combinations of ideas; or in the relations of complex ideas that are homogeneous. This proposition; that matter is geometrically solid, or that it is possessed of length, breadth, and thickness; expresses a combination of ideas, which constitutes a philosophical axiom intuitively certain. That color is extended, expresses another combination of ideas selfevidently true. When I affirm, that two and three are equal to five; or that the three interior angles of a triangle, are equal to two right angles; I express relations of ideas previously combined and homogeneous, which are intuitively, or demonstratively true. The axiom which affirms, that the whole is greater than its part, expresses a relation of ideas, the certainty of which is intuitive; yet it depends on a truth still more fundamental, which consists in a combination of ideas intuitively true. The complex idea of a whole composed of parts, which may be expressed by the affirmation, every whole is composed of parts, must be admitted as selfevident, before we can affirm intuitively, that the whole is greater than its part. To compare ideas and discern a relation between them, requires that they should agree in some things and disagree in others; and consequently, that they should be complex, and composed of homogeneous elements. The truths which consist simply in combinations of elementary ideas, must therefore universally be more fundamental, than those which concern the relations subsisting between them.

The definitions and postulates of Euclid, inaccurately recognise and describe certain combinations of ideas, on whose intuitive truth all geometrical certainty depends: his axioms express selfevident relations: his problems in general express demonstrative combinations, and his theorems demonstrative relations, of homogeneous ideas.

In all the cases we have thus mentioned, it is evident, that the truth or falsehood of the affirmation, depends on its conformity or nonconformity to the abstract realities of nature. Hence, in every abstract and general truth, there is necessarily a combination of ideas, conformable to the natural combination of the facts and principles they represent. Intuitive truth consists in combinations and relations, which are simple, familiar, and obvious; demonstrative truth consists in combinations and relations more complicated and remote. I should deem it not only unnecessary but impertinent, to be so tedious in this illustrative argument on the standard of truth, were it not disclaimed by the most popular treatise on this subject.

II. For the purpose of induction, it is necessary to be more particular, with respect to the objects of belief: it is necessary to distinguish the various kinds of truth from each other, that we may separately examine the sources of the energetic conception, on which our faith in them depends. All the objects of human knowledge, may be reduced to the two general classes of real existence, and the abstract nature of things; and to these classes we shall confine our attention in the present article.

We can effect no ideal conception, which will not either represent some real existence, some individual event; or consist in a combination of abstract ideas, and the relations they involve. We can frame no proposition, which will not either describe some particular fact; or express some general idea concerning the abstract nature of realities. When I affirm that Brutus killed Cesar, that London is the capital of Britain, or that there is a God who created the universe, I speak of particular facts, or real existences: when I affirm that the whole is greater than its part, that animal life is a physical effect, or that the assassination of a tyrant is an impolitic action, I speak of general truths, or the abstract nature of things. Every conception of the mind which is true, must consequently represent, either some individual fact; or some abstract combination of ideas, or abstract relation subsisting between those that are homogeneous.

THESE general classes of ideal conceptions, may again be subdivided in this enquiry, according to the different degrees of belief, which their various topics command; or the different sources of the various grades of energy. with which we conceive them. But these subdivisions may be made as we progress in the induction. I shall commence with the most infallible kinds of truth and conviction, and proceed to those more indefinite and feeble, alternating the topics of each class in my progress.

III. THE belief in matters of fact, produced by the evidence of sense, deserves our first attention. The perception of fact is the radical source of all true knowledge and conviction. All that we know concerning the reality of things and their general relations, the whole ideal fabric of the mind, is fundamentally derived from this source; nor is there any mode of producing conviction more omnipotent than sensual excitement.

IT will require no elaborate discussion to shew, that in this case, the conception believed is excited with greater energy, than any contravening idea can attain. The superior force and vivacity of perception, is the most obvious fact in the ideal transactions of man. Consequently the conception, which proceeds directly from the impression of an external object, must possess a degree of energy, which will infallibly render it a predominating action, and the subject of irresistible belief. If consciousness alone were insufficient to establish this truth, we might argue that all our ideas are necessarily produced by associations, which commence in sensual excitement; and that the secondary action cannot possibly exceed the force of the antecedent, by which it is introduced. When I see a volume for instance in a book store, neatly bound, and lettered 'Euclid's Elements' I am induced by association of ideas, and my knowledge of human arts and conduct, to believe that I shall find it full of geometry; but when I open and discover the New Testament, my belief founded on association, is dispelled like a dream by the force of perception.

IV. In matters of fact, perception produces the highest grade of belief; in the abstract sciences, those truths which are intuitive obtain an equivalent degree of credit, and deserve the next place in our induction. That the whole is greater than its part; that two and two make four; that matter is geometrically solid, and colour extended; are axioms believed with as much certainty at least, as the perceptions of sense. The truths of this kind, which it has been necessary to notice and express by words, are not very numerous, and principally occur in the mathematical sciences. But if a penetrating genius were to examine the most elementary combinations of his ideas, he would be able to frame a great many other propositions, not less intuitively certain than the axioms of geometry.

According to our theory, the conception of intuitive truth, is performed with a grade of energy incomparably greater, than any contradictory proposition can possess. Having already ascertained, that truth is the conformity of our ideas to the nature of things, it will not be difficult to shew, from principles already established, that intuition must produce the most incontrolable energy of conception.

All the principles of nature are exhibited to the senses in a state of complexity. We neither receive by our intercourse with material objects, nor can attain by the process of abstraction, any idea entirely simple and uncombined. All our ideal conceptions are primarily complex, and are incessantly reiterated in the same state, by our subsequent intercourse with their objects, and by the operations of memory and imagination. Consequently all our elementary ideas, must unavoidably be associated in the mind, conformably to the natural combinations of sensible properties in external things. These mental combinations are formed in our earliest infancy; they are incorporated with the first rudiments of the mind; and are reiterated without any radical change in every thought of our lives; they must consequently become indissolubly firm, and acquire the greatest ease and energy of conception. You must subvert every principle of the understanding, and reduce the mind to unqualified confusion, or its primitive vacuity, before you can pervert that coherence of ideas, which is instituted in this manner. When any elementary idea is excited, it must consequently revive its natural associates with irresistible power.

Even artificial associations of dissimilar ideas acquire an uncontrolable force. Thus, the connexion of words and ideas becomes so irresistibly strong, that few can either think without words, or hear words without a revival of ideas. How much more firm, and easily conceived, must those more early combinations become, which are formed of homogeneous ideas, received by the same organ, and essentially coherent in their first conception; and which are incessantly repeated every minute of our waking hours. To dissever them, or conceive a recent composition with greater force, must be wholly impossible. Shall we then suppose, that the temporary structures of the imagination, can possibly attain greater energy and firmness of cohesion, and thence be able to induce a contrary belief? Shall we suppose, that the fancy can at any time produce a new connexion of elementary ideas, sufficiently powerful to distract their ancient and natural coherence, and exceed its facility of repetition?

WHEN a combination of ideas, or complex conception, has become indissoluble by any power of the mind, it must be impossible even to conceive its contrary, or its negative form; for this requires some degree of disunion and new arrangement of its parts. And every primitive and unvarying association, necessarily acquires this degree of coherency. That the whole is composed of parts, expresses a combination of ideas, which has occurred in every conception of my life; I can form no idea, nor even feel a sentiment, in which it is not verefied; and the relation it involves, that the whole is greater than its part, must be equally familiar to my mind. How then shall I conceive that which is opposite and contradictory? All selfevident truths are of this description.

They consist of ideas so early, invariably, and thence so firmly combined, that we cannot conceive what is contrary to their combination, or the relations it involves. It cannot therefore be a subject of doubt, whether we must necessarily conceive the affirmative side of an intuitive proposition, with more energy than its negative; since that negative is absolutely inconceivable. It is however, the irresistible energy of conception, and strength of coherency in the elements of an intuitive truth, acquired by incessant repetition, which renders its contrary inconceivable.

V. That belief in matters of fact, which is founded on memory, forms a secondary grade of certainty in this class of truths. It is impossible to remember any matter of fact, or real occurrence, with such indubitable certainty, as not to be disproved by the present evidence of sense; for perception is always more energetic than memory. But there is no source of belief concerning real events, which can surpass or even equal the certainty of our clearest recollections. Do the ideas of memory necessarily possess a grade of energy, corresponding to this secondary grade of assent, which they command? All the ideas of the mind, according to the common language of metaphysicians, belong to the faculty of memory; but our present enquiry concerns those combinations alone, which represent particular realities and events formerly perceived.

It is a fundamental law of excitement, that facility and force of conception are acquired most completely by forcible practice. Consequently that combination of ideas, which has once been excited with the energy of perception, must afterwards be revived with greater ease and vigour, than any imaginative conjunction, which has never been experienced in the same forcible manner.

Belief in a given combination of ideas, proceeds from our being able to conceive it with more firmnes, than any other which is contrary and discordant: and that mode of combination, which has already been powerfully excited, must naturally be more excitable than any unknown, or imaginative composition of the same ideas; and must therefore possess this requisite of belief. When any complex object, as a garden full of shruberies and herbs, is presented to my sense of sight, it produces a specific complex conception, possessing the highest grade of energy; and its various subordinate parts, of course, become associated in a certain order, with proportionate firmness. When one of them is remembered, it will therefore strongly suggest the others in their proper order; and the whole will thence be conceived more forcibly in its natural form, than it could be conceived with any new arrangement of its parts, and will thus produce the grade of assurance that is characteristic of memory.

The constituent items in every complex conception, having all been performed innumerable times, must be equally familiar and firm as individual ideas; but the connective excitement, which cements them together in a given case, is first performed when that combination is first made; and must therefore be firm and efficient, in proportion to the energy with which it is then excited, and the frequency of its subsequent repetition. The combination which is instituted by perception, must consequently be as much firmer than that which is effected by ideal excitement, as a perception exceeds the strength of an ideal action. But whether it shall retain this superiority, and continue to command the second grade of assent, will depend on its subsequent repetition. The ideas of memory, which are rarely repeated, continually decline in energy, until they become undistinguishable, not only from the probabilities depending on evidence and argument, but also from the transient combinations of fancy.

There is also another cause for the superior strength of our faith in the conceptions of memory. That combination of ideas, which is excited with the force of perception, must naturally raise a higher grade of sentiment, than the combination which is merely established by ideal excitement: when recollected again, it will consequently produce by association a stronger sentimental effect, than the revival of an equally important idea, with an equal degree of energy; and this sentimental effect is the principal and efficient attribute of belief.

When the perception of any fact is recent; when it has excited much interest, and therefore great exertion; and when its conception has been frequently repeated; its revival will necessarily be easy and energetic—and in contrary circumstances it will be difficult and feeble. It is extremely evident, that these circumstances produce corresponding effects on our belief in the facts we remember. We may therefore conclude, that belief in the conceptions of memory, corresponds in every case to the degrees of energy which attend them; and that they have always more energy than any fiction, or any contradictory proposition should naturally possess.

VI. In general truth, demonstration produces the second grade of belief. It seems to possess the same place in this class, that memory occupies with respect to matters of fact. It universally surpasses every mode of producing conviction in the abstract sciences, except intuition itself, which it never can equal. When I see this proposition demonstrated, that the square of the hypothenuse, is equal to the squares of the other sides, I cannot possibly doubt of its truth, nor yet believe it with that degree of certainty, with which I am assured, that the whole is greater than its part. If I could intuitively perceive its falsehood, no demonstration could make me believe it; nor, if I intuitively perceived its truth, could any demonstration make me disbelieve it. Some geometrical propositions are both selfevident and demonstrable; that the diameter is the longest line within a circle; that the angles, which one straight line makes with another where it meets it, are equal to two right angles; are of this description: they are intuitive, and their demonstration rather tends to obscure, than to render them more certain.

An intuitive truth consists in a combination of ideas, which is so simple and firmly coherent, that its conception is always complete, unchangeable, and energetic; or it consists in an obvious relation between ideas thus combined. A demonstrative truth is a natural combination of ideas so complex, or relation between them so remote, that the mind cannot apprehend at once all the items concerned. Demonstration consists in passing attentively over all those items, or intermediate parts, on which the remote connexion or relation depends. When we come to the conclusion, the intermediate parts are forgotten, and we simply retain and connect the primary and ultimate ideas, in the manner which the intermedial succession has authorised. The connexion of all the intervening ideas with each other, must be intuitive; and the process of demonstration is therefore a stream of intuitive truth. Its various items must consequently succeed each other in the mind, with that infrangible coherence, and irresistible energy, which naturally accompany intuition; and the conclusion itself must ultimately be conceived in this manner, and of course be inevitable. As the truth of the conclusion, however, involves a combination of ideas, which cannot be fully comprehended at once, it necessarily depends on a species of memory, and must therefore be inferior to the intuitive conceptions from which it is derived. Demonstration therefore produces a degree of energy and coherence in the concluding conception, which no power in the mind can resist; and this is all that is necessary to produce unbounded conviction.

VII. A GREAT multitude of facts, are believed with different degrees of assurance. which are neither retained by the memory, nor apprehended by the senses. Their greatest certainty is naturally inferior to that produced by the strongest evidence of memory. I shall comprehend them all under the denomination of probable facts; and enquire, whether they are necessarily conceived with degrees of energy, corresponding to the degrees of assent which they are known to command.

Our knowledge and belief concerning probable facts, apparently depend on a multiplicity of sources; the testimony of eye witnesses, tradition, history, visible memorials, and other realities; but they may all be reduced to one simple and obvious source, the connexion of cause and effect. All my affirmations concerning realities, which I do not personally know, are predicated on a connexion of this kind, between those realities and some fact which is present to my senses or memory. If I should undertake to prove, that Kentucky was formerly inhabited by a people more civilised than the present American savages; I must do it by describing appearances that indicate, according to the connexion of cause and effect, a prior state of things, which must have been produced by human art and industry more considerable than the present savages possess. When I would assign a reason for my belief, that London is the capitol of Britain, or that Bonaparte is the emperor of France, I mention some fact which I now experience or remember, and with which the other is connected by causation direct or remote; for instance I have oral or written testimony of these facts; and I believe the testimony, because I remember that human affirmations in such cases, are the natural effects of apprehending the truth.

In every possible case, our knowledge and belief concerning remote events, may be shown to depend on this principle of connexion. It is not however a medium of rational inference. We have no direct knowledge of the intrinsic powers, by which causes and effects are connected together. We can discover no intrinsic relation between them; nor assign any reason why the one should be conjoined with the other. Our inference is entirely founded in habit; or in the association of ideas. We have already seen, that all our ideas inevitably become associated together, according to the natural course of causation. We no sooner perceive the objects of nature, than we perceive them succeeding each other in a regular and invariable order; and this succession is reiterated in our thoughts, as often as we advert to the objects of sense, or revise their ideas by memory and imagination. Hence the veriest infant who can think, and who is perhaps still inconscious of existence, is led by the omnipotent sway of habit, or the association of ideas, to infer causes and effects from each other. There is indeed no association, which can be formed much anterior to this; and very few that can be more frequently repeated. It is connate and incorporated with the elements of thought, grows with their growth, and strengthens with their strength. Hence the combination of the abstract ideas of cause and effect, becomes absolutely infrangible, and consequently selfevident. That whatever begins to exist, proceeds from some cause, is a proposition that approaches at least to the grade of intuitive certainty. Hence the idea of creation must be incomprehensible, for it proposes to represent the commencement of something from nothing, and thus contradicts an intuitive truth.

Returning from this digression, I repeat it as conclusively established, that belief in any probable fact, proceeds from the perception or memory of some other fact, with which it is associated in the order of causation. And it has already been experimentally proven, that the primary link in associate motions, communicates its energy to that which ensues. Hence we discover the source of that energy of conception, in these cases, which is the immediate cause and substance of our faith. The affirmative conception of the fact we believe, being in every instance associated with some present perception of sense, or recollection of memory, necessarily derives from this source, a greater degree of energy, than ever can be attained by its negative form, or the fictions of fancy, which are not reinforced by any associated energetic action.

The association of the abstract ideas of cause and effect is indissoluble; but the association of particular causes and their effects is less firmly established. Those cases of causation, which have been early and repeatedly experienced without any change, become very firmly coherent, and produce great certainty of belief, in the facts which they enable us to infer. Others which have occurred less frequently, or have in some instances been apparently contradicted, are proportionally feeble, and produce less energy in the conception of those facts which they tend to establish. Hence our belief in probable facts, produced by the association of cause and effect, like our faith in the ideas of memory, varies through all the grades of probability from the shadow of assurance to the firmest conviction.

VIII. PROBABLE truth holds a corresponding rank in certainty to probable fact. It can never produce, on its own proper merits, that degree of conviction, which accompanies selfevident and demonstrable principles; but it excites every grade of assurance inferior to the certainty of demonstration. All the sciences which are cultivated by mankind, except the mathematical; that is all our systems of generalisation; are composed of these probable truths. All our theories of human nature and its correlative subjects; as metaphysics, logic, criticism, morality, politics, medicine, music; with all our systems of natural philosophy and chemistry; consist in collections of general principles, whose certainty is neither selfevident nor demonstrable.

A PROBABLE truth consists in a combination of abstract ideas, or in a relation it involves, which is neither intuitive, nor demonstrably true; but which is so plausible, or so conformable to our experience of nature, that it commands a portion of our confidence. The association of cause and effect, is generally involved in these combinations, by which they are placed on a parity with probable facts, in which our belief depends on the same principle. That animal life is the effect of organisation; that mind is merely an organic state of matter; that the practice of virtue is necessary to the existence of civil society; are examples of abstract, propositional, ideas involving causation, in which our assurance can never exceed probability. All ideal combinations of this kind, with the relations they involve, it is obvious are predicated on an experience, which is complex, indefinite, contradictory, and generally unfrequent. But an experience of this kind cannot, according to the general laws of association, produce much strength of coherency in the ideas it combines, nor render them highly excitable. Consequently we shall be able, to conceive their negative and discordant forms of combination with some facility and force. The predominance of energy in the affirmative conception of probable truths, must hence in every instance be comparatively inconsiderable, but various according to the degrees of simplicity and frequency in the experience, on which it is founded. In many instances indeed, it becomes so great as to command the most complete practical confidence, and is often by artificial means rendered equal to intuition itself.

IX. Possible facts and truths produce the lowest grade of assent. A possible fact is a combination of ideas conformable to our general experience, or consistent with all our established truths; but not associated by causation with any accredited fact, from which it might derive credential energy of conception. All the fictions of poetry and romance should belong to this class: their negative form in general is strongly associated with some energetic conception; whence their belief is effectually prevented. A possible truth is a combination of abstract ideas, which has neither any intuitive coherence, nor is contradicted by any established principle. The negative and affirmative forms of such a proposition, may generally be conceived with equal energy and ease.

An impossibility is a verbal proposition, signifying a complex idea which is inconceivable, or which is contradicted by conceptions possessing the highest grade of energy. That which is contrary to intuitive truth, or the present perceptions of sense, belongs to this description, and cannot possibly be believed.

X. We have now examined every section in the circle of belief. On the side of particular realities, we have shown; that the mind gives a regular gradation of assent, from the fact perceived by the senses, to that which is diametrically opposite and therefore impossible; that on the side of abstract truth, similar phenomina occur, from intuition to its opposite, impossibility; and that in every case, the energy of conception corresponds to the degree of belief which is known to be excited. And we presume that we have thus fully established the theory, which was analytically developed in the preceding chapter.

By the investigation through which we have progressed, we conceive that the following propositions are authorised. 1. That belief consists in energy of conception, to which it always corresponds in degree. 2. That truth, which is universally the proper subject of belief, consists in an association of ideas, conformable to the real combination of the sensible properties and objects in nature, which those ideas represent. 3. That from the nature of perception, our ideas necessarily become associated in conformity to the order of nature. 4. That those combinations in nature, which are most simple, obvious, and familiar, must produce the firmest coherency of ideas. 5. That others more complex, indefinite, and unfrequently recurring, must produce associations proportionally feeble. 6. That the various degrees of coherency and energy of conception, with which our abstract complex ideas are thus imbued, excite corresponding varieties of belief from intuition down to mere possibility. 7. That in matters of fact, the transcendent energy of perception produces the highest grade of belief; and establishes the particular associations, which are the subjects of memory and the belief it inspires. 8. That all other ideas of facts that are believed, attain the credential degree of energy, by their connexion of causation with facts perceived or remembered.

CHAPTER XIV.

THE SAME SUBJECT CONTINUED.

IN this part of our enquiry concerning belief, we propose to consider some anomalous appearances and circumstances attending it; and to examine the nature and tendency of certain principles, apparently inconsistent with the preceding theory. We shall commence with an investigation of consistency, and of its influence on belief.

I. THE essence of things is unchangeable. One species of existence never encroaches on the precincts of another, nor varies in its intrinsic and peculiar properties; and in all the phenomina of causation, the concourse and succession of the efficient unalterable elements, conform to a fixed invariable order, dictated by their relative properties and powers. The system of our ideas is copied entirely from the system of nature, which it is destined to represent; and necessarily conforms to the same order and harmony. The efficient powers, which are supposed to bind the elements of things together, and to direct them in the rotine of causation, are indeed undiscoverable by the senses; but the principle of association performs a correspondent function in the ideal system. It combines our elementary ideas, in collateral and consecutive tribes and trains, conformably to the natural concourse and succession of the sensible properties from which they are copied. And this intrinsic harmony of our ideas, in unison with the regularity of nature, is the source and the essence of consistency.

SOME modes of combination among our ideas are simple, fundamental, and common, and hence become intuitive axioms, or general modes, to which all correct associations must conform. In constructing a system of science, we assume certain elementary combinations of homogeneous ideas, as infallibly true; and proceed to develope all the more complex associations, of which the same ideas are susceptible, in conformity with the fundamental modes of combination. When none of these modes are infringed; when no fundamental rule, no abstract principle of order is violated; the system is pronounced to be consistent; to be consentaneous with itself, and conformable to the abstract order of nature in all her works. Yet the whole fabric may be false. Its elementary combinations may be incorrect; though all its more complicated parts be conformable to the essential rules of construction.

IT is obvious, that consistency must tend to produce conviction; for it is the common order of coherency among our ideas, on which the energy of conception is materially dependent in every instance of belief. When the greater number of combinations formed in any assemblage of complex ideas, is strictly conformable to the general order of nature, and none of them is inconsistent with it, the consequent prevalency of energetic coherence, must naturally excite a high degree of assurance. Hence it is extremely difficult to elude the imposition of error both speculative and historical. If a theory in any department of science, or the narration of any historical event, be simple and consistent, we readily overlook its erroneous foundations. When the great outlines are conformable to the common order of nature, they over balance the enfeebling opposition of radical absurdities, and produce that energetic coherence on which belief is dependent.

Similar to the influence of consistency, is the power which illustration possesses to enforce an abstract opinion, or a doubtful theory in science. If an abstract proposition which is plausible, or even obscure and inconsistent, be compared with some sensible object that resembles it, the mind readily mistakes the clearness and coherency of this likeness, for the real attributes of the principal idea; or by the extemporary association of resemblance, the energy of the image is transferred to the abstract proposition to be illustrated. When Dr. Rush explains his doctrines of animal life, by an ingenious comparison of the vital system to a violin, he doubtless enforces his opinions on the generality of his readers, with greater success, than when he attempts to establish them by argument.

I have frequently remarked, that when a person of an ordinary and uncultivated mind has embraced an erroneous abstract opinion, his fancy readily fixes on some sensible object to which it is apparently similar; and whilst his attention continues fixed on that object, it is impossible to convince him of his error: he mistakes the consistency and force of the illustration, for truth in the proposition illustrated; and is wholly unable to discover the applicability of objections, which are made to the abstract conception itself. The most ingenious enquirers can scarcely avoid such mistakes in the moral sciences. Nearly all the technical terms in these sciences are metaphorical; originally they were employed to express sensible appearances; and it is extremely difficult, perhaps impossible, to avoid mistaking the qualities of these appearances, for the properties of the abstract ideas indicated by the same terms; or to prevent a transference of the energy in the sensible, to the similar abstract conception. "By a well chosen figure, says Dr. Blair, even conviction is assisted, and the impression of a truth on the mind made more lively and forcible than it would otherwise be—an image that presents much congruity between a moral and a sensible idea, serves like an argument from analogy, to enforce what the author asserts, and to induce belief."

THE power of analogical reasoning itself, depends on the same principle; on the extemporary communication of energy from the familiar idea, to the uncommon one which is similar; a process on which the utility of experience itself, as we formerly explained, is entirely dependent. Illustration, analogy, experience, are indeed nothing more than different degrees of proximity, in the resemblance of former conceptions, to the present subject of attention. We should hence be extremely careful to distinguish between them. Experience, when clear and extensive, justly excites that grade of assurance, which is termed moral certainty. Analogy should only produce a grade of probability, proportionate to the degree of coincidence in the analogous cases. When the coincidence becomes substantially complete, the analogy terminates in experience. It is very unfortunate, that illustration and figurative language, which are so powerful in communicating instruction, and so pleasing in eloquence and poetry, should necessarily be the source of embarrassment and error in our researches after truth.

II. In the hours of sleep, if any strong impression is made on the sense of feeling, by unity of excitement and association it will excite the senses and the mind into activity, and awake us from slumber; or if the sensation be disagreeable and moderate in strength, it may simply excite certain associated muscular motions, which will change our posture and give us relief; or producing neither of these effects, it may only rouse the mind to that sentimental and ideal activity, which constitutes a dream.

All the ideas which occur in this state of the mind are accompanied by the most implicit conviction. This forms a decisive argument for the present theory of belief. Our dreams are extremely incoherent, and unsupported by any kind of evidence. They agree with our waking convictions in one property alone; they constitute the ideal conceptions of the mind which possess the greatest energy. This property must consequently be the source of our belief in both instances. The same effect must always proceed from the same cause: the belief which accompanies both our dreaming and waking conceptions, must proceed from some quality common to them both; but they agree in no attribute, capable of producing this effect, but that of predominant energy.

It cannot be objected, that we credit our dreams because we believe them to be perceptions of sense; for this would be resolving one kind of belief into another equally inexplicable. We mistake our dreams for the perceptions of sense, from the same cause that we believe them, their predominating energy. In our waking hours, the strongest sensorial action constantly proceeds from perception; and in sleep we refer it by association to the same source.

Our dreams, like our waking imaginations, may be remembered for some time; but we cannot then believe them, for they are intrinsically inconsistent; their falshood is connected by causation with facts perceived and remembered; and having originally been ideal, their repetition has less force than the memory of perceptions.

The reveries or day dreams, which are said to occur in certain temperaments, tend also to the confirmation of our theory. In them the mind acquires, by contemplating some interesting subject, a degree of energy in its ideas, which exceeds the ordinary force of sensual excitement; and thence it necessarily mistakes them for perceptions. In delirium and insanity similar events occur. When the brain is much affected by a fever, it becomes so very irritable, that its internal irregular excitement exceeds the force of ordinary perception, and consequently produces belief in the most incoherent and wandering imaginations. And in maniacal affections of the brain, certain absurd combinations of ideas acquire such strength of conception, and certainty of belief, that neither intuition nor perception can supplant or refute them.

III. THE vivacity and force with which we conceive a beautiful and moving fiction of the fancy, without believing it, may seem to contradict this theory of belief. When we read in a romance an ingenious and interesting story, narrated with all the ornaments which poetry and eloquence can afford, it is true, that it makes a very strong impression on the mind; we conceive its ideas with great clearness and force, and feel its sentiments with the ardor of enthusiasm. Yet we are still conscious, that its energy is inferior to the force of sensual excitement. The most lucid, circumstantial, and forcible description, aided by all the powers of delivery, cannot induce us to mistake the ideas it conveys for the intimations of sense. The question then must be, whether we do not conceive such a fiction, with as much energy, as probable facts which command our assent.

WHEN the mind is unusually excited by poetry, eloquence, or an interesting conception, not only the imaginative ideas themselves are conceived with great energy, but by unity of excitement a corresponding increase of force, is communicated to all contemporary ideas and perceptions. The proper objects of belief must consequently predominate over their fictitious rivals, with nearly as much strength as on other occasions. They will therefore be able to enforce the falsity of the fiction, with which they are always associated by causation, so effectually as to preclude the possibility of its belief. When the attention of the mind is wholly abstracted from the impressions of sensible objects, and all the energies of the sensory are employed on some affecting imaginary event, the ideas of the imagination may attain predominant force, and excite belief, as we experience in the occurrence of a reverie: but whilst our attention to sensible objects is preserved, as by the sounds and written characters which convey the ideas of oratory and romance, it is impossible that the perceptions of sense, the recollections of memory, and their associates in the order of causation, shall not retain their superiority, and falsify the contradictory combinations of fancy. The sentiments excited by a fiction, must always be inferior to those which would be produced by a similar reality, though sufficiently vehement to modify the temper, and thence to affect the voluntary conduct.

THEATRICAL representations may probably be viewed as the source of a more imposing objection to this theory, than is furnished by romance.

AT a theatre we believe all the perceptions of our senses. The audience, the stage, the scenery, the players and their words and actions, are all believed to be as they appear to sight and hearing. What then do we disbelieve, which it may be supposed we conceive with great energy? The opinions and sentiments of men are indicated by their words and actions; but the truth or falsehood of this indication, is determined by concurring circumstances. In a playhouse the circumstances we perceive and remember, positively and forcibly contradict the customary inference from the conduct of the actors; and we therefore cannot conceive it with predominating energy, and believe that their opinions and sentiments are what they seem to be. So in written and spoken language, the perception of certain marks and sounds, infallibly excites the ideas we formerly associated with them; but the superior energy of the affirmative, or the negative conception of those ideas, depends on other circumstances besides the mere perception of the words by which they are indicated.

IV. BUT although the energy with which we conceive an ingenious and interesting fiction, be inadequate to the production of belief; yet it has a manifest tendency to that effect, and if reinforced in a very small degree will actually produce conviction. This is particularly obvious in the disposition of the uninformed part of mankind, to believe in every narration which partakes of the marvellous.

CERTAIN combinations of ideas naturally affect the sensibility of the precipient organ, and produce an evident degree of sentimental excitement. Perhaps all our ideas had this effect on their first production. It is certain at least, that every kind of action is accompanied by more sensation, when it is first excited, than when it becomes habitual. Hence, when a marvellous story on a subject naturally interesting, is first communicated to the undisciplined mind, its novelty, greatness, and interesting nature, conspire to produce an intensity of sentimental action, which gives an impulse, by unity of excitement, to the general exertion of the sensory, and by thus reacting on the ideal departments, augments the energy of those very ideas from which it originated. The attention of the whole sensory becomes entirely occupied, by the marvellous subject alone; the powers of reflection are suspended; the mind becomes incapable of scrutinising the impressive absurdity; and if no contradictory perception of sense, or recollection of memory, intrude with great contravening force, a degree of conviction, of tempory conviction at least, must ensue.

Hence events the most singular, astonishing, and important in their consequences, are credited on testimony, which would be rejected almost without consideration in the common affairs of life. The energy with which we naturally conceive such grand subjects, ensures their acceptance. To this cause we must chiefly attribute the origin of all those popular religions, which have risen in barbarous ages; which are unsupported by satisfactory evidence; and which are intrinsically absurd, and inconsistent with the nature of things. The tendency of the mind to believe the marvellous, strongly corroborates our theory of belief; for there is no circumstance common to this, and to an ordinary conviction, by which belief could be produced, except predominating energy of conception.

V. The circumstances attending the exercise of attention, may probably furnish the most plausible argument, which can be adduced in contradiction of the present theory: but it will not be difficult to show that it is only plausible.

'THE sphere of attention in the human mind, it may be said, is not very ample; it embraces but a small range of ideas and sentiments; and we are scarcely conscious of the excitement, which occurs beyond its precincts. That subject must be extremely limited, which can at once be clearly and fully apprehended; and all that is not apprehended is apparently nugatory and inconsequential. The objects of attention are therefore conceived with greater force and vivacity than any other contemporary ideas: but all the attention of the mind can be concentrated on a false uncredited proposition: it is consequently not the predominating energy of conception which constitutes belief.'

THE plausibility of this objection, proceeds in a great measure from inconsiderately confounding perspicuity with force; qualities which were formerly ascertained to be so entirely different from each other, that a high degree of the latter is wholly inconsistent with the existence of the former. It is undoubtedly true, that attention is necessary to perspicuity, and that it encreases energy itself, though insufficient to render it predominating and credential. To conceive a complex idea with conscious accuracy and clearness, it is absolutely necessary that we should give it the strictest attention; but a review of this operation will prove, that it does not necessarily confer that predominance of energy which is indispensible to conviction.

ATTENTION to an idea consists, in performing it in a particular central portion of its appropriate department; and in repeating its ideal and sentimental associates, in the corresponding portions of their respective provinces in the sensory. The idea that is most interesting, is habitually transferred with all its connexions into these central parts, and is thus rendered the subject of attentive, and of rational consideration. These are facts ascertained by consciousness, and by the circumstances attending the perceptions of sight. The optic image of that object, which we desire to examine with attention, is voluntarily received on the central part of the retina for this purpose. And the visual department in the sensory derives its ideas, and habits, and laws from this sensual organ. Hence, whatever can be affirmed of the latter, must be equally true in the transactions of the former: the exercise of attention, in both ideas and perceptions, must correspond to the same principles and display the same facts.

BUT in our visual perceptions it is evident, that the action excited in the centre of the retina, to which we attend, is not necessarily more energetic than any other. We can attend with as much facility to a black object, as to the white one which is contiguous; though the former necessarily excites the lowest grade of perceptive action. We can attend to a black coal in the fire, whose impression must be vastly more feeble, than that of the adjacent blaze, to which we may be wholly inattentive, and even inconscious of its existence. In our ideal conceptions these events may again be reacted; and we may consequently attend to those ideas, which are neither clear nor energetic; and which must be greatly inferior to contemporary perceptions, of which we are at the same time wholly regardless.

In those sensations, whose strength we can estimate, it is extremely clear, that the one to which we attend is not always the most energetic. The strength of action in the point of attention both sensual and sensorial, as in all other excitable parts, must correspond to the quantity of stimulus, and the perfection of excitability, from which it is produced. Energy and attention can therefore have no essential connexion, or dependence on each other.

It is contended by Mr. Stuart, a writer in whom learning and genius are equally conspicuous, and who is remarkable for nice intellectual observation; that we constantly believe in the ideas to which we attend, so long as we give them exclusive attention. I cannot agree to the full extent of this opinion, though I am ready to concede, that attention has a manifest tendency to produce belief, by invigorating our ideal conceptions. The adoption of his doctrine, however, would harmonise our theory with the objection we have been answering. We might receive it, and then maintain, that energy of conception is the essence of belief; that exclusive attention produces this energy as objected above; and that it also produces a temporary belief as this author contends. Nor would the effects which naturally flow from belief be inconsistent with these positions. For no imaginative combination of ideas, could ever exclusively occupy the attention, and possess predominating energy, so long as to render its peculiar sentiment the temper of the mind, and thus impel us into an improper course of action. The attention is incessantly adverting to new perceptions, and to ideas habitually energetic, which thus reinforced would be able to institute a temper, that could not be supplanted by the momentary and feeble predominance of any imaginative conception to which we might attend. And this would particularly be the case in all our voluntary transactions, in which we are conscious that the attention is uncommonly vagrant. It must consequently be unable, though it should constantly confer predominant energy and induce belief, to affect in any manner our permanent convictions and voluntary conduct.

VI. In this article, we purpose to make some remarks on difference in opinion, and also on controversy its natural effect.

From the nature of belief, and the ordinary course of human affairs, it is sufficiently evident, that a great diversity of opinions must prevail in the different members of society. The degree of credit, which is given to the greatest number of interesting propositions, depends principally on education; and it is impossible to find two persons, who have undergone the same discipline from the cradle to the age of manhood. The opinions and sentiments imbibed by one from his parent, his teacher, and his early companions, are often directly the reverse of those impressed in the same way on the mind of his nearest cotemporary; and their own personal experience, and deductions of reason, will often be equally diversified in the complicated affairs of morality, politics, and religion.

Nor will the opinions thus instituted in different minds be more variant, and worthy of remark, than the diversities of faith displayed at different times in the same person. Ampler experience, and more circumspect reasoning, are the correct and proper methods, by which the errors of education and infantile imbecility are necessarily corrected, and views more just and comprehensive acquired as we advance in life. But opinions are also frequently changed by other means, which exert an indirect and imperceptible influence on the operations of the understanding. The plastic power, which sentiment exerts on our ideal conceptions, may, inconsciously to us, transform them into any shape, and enforce them to the grade of confidence. Whatever probable fact or doctrine, would be eminently convenient and agreeable to us if true, may readily insinuate itself into the articles of our creed, or attain credential energy of conception, by its sentimental influence.

And when one important change is introduced, it is impossible to say how far its consequences may extend. All the ideas and sentiments of the mind are linked together by association. Some are intimately combined; whilst others are remotely connected by intermediate parts. A change in any given combination, whether caused by argument or feeling, must consequently affect the whole of its correlative excitement. All the sentiments and ideas relating to the same affair, will naturally undergo a corresponding change in energy and mode of composition. Nor can the mind be conscious, that these secondary effects are ensuing, even from an acknowledged change of opinion. It can only discover at a future period, that its convictions on a given subject are different from what they formerly were, without any rational considerations having intervened to change them. It is hence impoſſible for any person, to assign adequate reasons for his opinions, or motives for his conduct, on every occasion.

Belief is one of those fundamental principles in the mind, from which all the voluntary conduct of mankind must originate. Hence the convictions of an individual, on many interesting yet doubtful affairs in religion, morality, and politics, must be highly important to himself, to his companions, and to the society in which he lives. When these matters are agitated in social intercourse, a mutual endeavor will consequently be made, by those who have different views, to correct the supposed errors they discover in each other; and thus a controversy will be produced. But nothing can be more ineffectual, and in general more pernicious, than these attempts to rectify our mutual errors of opinion on subjects of interest and importance.

These subjects of disputation are generally so complicated, indefinite, and obscure, that it is impossible for the human mind to arrive, by rational inquiry, at any thing like certainty in the various questions they afford. Its utmost sagacity, exerted in the most extensive and circumspect researches, still leaves ample room for scepticism and hesitation. Yet we rarely find an individual, who does not entertain the most positive convictions on these topics. This proceeds from the immense influence of early education, by which his opinions are instituted; and from their interesting nature, which causes the mind to conceive them with preternatural energy. It must hence be obvious that it will generally be impossible to effect a change in them by argument.

The most positive belief on an interesting subject, may indeed be commonly subverted, by the direct force of an argument that is clear, concise, and cogent; but the topics, on which these positive and disputable convictions are usually entertained, are naturally so indefinite and doubtful, that they can at best afford no more, on either side, than a plausible declamation. This will necessarily appear quite incoherent and feeble, to the mind in which there is so firm an assurance of the contrary. For a positive opinion, like an intuitive truth, prevents the mind from conceiving with due energy, and clearly understanding, any contradictory combination of the same ideas, which may be advanced to refute it. And it must also prevent the assailant from making the best argument, which his cause will admit; for he will naturally advance his own firm correlative prejudices, as the strongest reasons to be found, though they must necessarily be crude and incoherent to the apprehension even of an impartial mind. Hence when two persons of opposite opinions, argue together on an interesting topic, each naturally assails and defends in a very imperfect and inefficient manner; and is at the same time wholly unable to apprehend the feeble force, which is really exerted by his adversary. Such argumentation must consequently be frivolous and impotent. And if nothing more could be said against it, we might smile at their folly who pursue it; but worse effects than want of success commonly ensue.

Disputation naturally tends to raise the angry passions. Each party believes himself to be right, and to be engaged in maintaining the most valuablo cause; whilst he views his adversary as laboring to effect an evil purpose, with which he inconsciously identifies him by association of ideas, and thus transfers upon him, a portion of the dislike which that purpose excites. Each party must also feel ambitious to obtain the ascendency, as a personal gratification, and must therefore entertain some degree of jealousy towards the other, as a rival in this respect. As the controversy proceeds, sufficient causes unavoidably occur, to invigorate these rudiments of dissocial feeling into angry vehemence. The disputant on either side, through prejudice, believes his own crude argument to be as clear and strong as demonstration; and at the same time views the equivolent remarks of his adversary, as extremely feeble, incoherent, and impertinent. Hence they mutually suspect each other for perverseness and dishonesty, till hate and indignation rise to an excessive height.

When the angry passions once commence in any controversy, they rise, accelerated by sympathetic influence, in a ratio that much exceeds the direct power of their proper causes. Every sentimental word and gesture of the angry kind on either side, invigorates the animosity of the other; and this effect is then reflected, by its natural indications, to the source from which it sprung. And thus, by the sympathetic reciprocation of sentiment in a continued controversy, the slightest dislike is aggravated to the utmost inveteracy. Nor could any other effect collaterally occur in disputation, which would more powerfully incite exertion, and at the same time render it ineffectual. The ardor of an angry opposition, which naturally excites the disputant to great activity, enables him to conceive his own opinions with increased energy and assurance, and thus precludes him more effectually from conceiving the arguments of his adversary. And hence each party in every animated contest, continually becomes more confirmed in the opinions which he first maintained.

SYMPATHY is an agent immensely powerful in all the social transactions of life. By its proper management, much more may be effected in society, than the utmost powers of reasoning can ever accomplish. If I would persuade my companion to adopt some principle, or pursue some course of conduct, to which he is now opposed, by what means shall I effect this purpose ? His opinion is positive, and the subject is intricate; yet I proceed to convince him, by argument alone, that his opinion is erroneous. My reasoning to him must necessarily appear incoherent and feeble; to enforce it I become vehement. I feel conscious of superior wisdom, and of superiority in argument; and I become indignant at his ignorance and obstinacy. These sentiments, expressed by the natural and the artificial language of passion, are instantly conceived by him, and repel me with my projects from his soul; and thus my attempts terminate in strengthening his primitive opinions. If I would succeed, let me remember on the contrary, that sympathy is powerful, and that argument is feeble, in all the doubtful affairs of life, on which there is so much difference of opinion. I shall then attempt to inspire him by the natural language of passion, with feelings of cordiality, and the sentiments which correspond to the opinion I would impress, or the conduct I would engage him to pursue. By this course I may succeed in impressing my views on his mind. No man can resist the sympathetic insinuation of sentiment, nor the influence it exerts on his opinions and conduct.

THERE is in general so little effected by eager controversy, that it would certainly promote the happiness of mankind, to banish it entirely from society. It creates animosities, which continually embitter the intercourse of social life; and instead of producing the unanimity at which it aims, it constantly increases the difference in opinion which previously existed. Even in its mildest form, it frequently has this effect. When I frequented debating societies in my pupilage, I generally became a convert to any doubtful, or even improbable opinion, which I was appointed to defend. By pondering on that opinion, with all its correlative ideas, I acquired an ease and energy in conceiving it, which commanded my assent. In the same way, those who frequently relate a matter of fact as true, which they know to be false, at length attain to such facility and force of conception, that they believe it themselves.

VII. HAVING sufficiently discussed the principles of belief in that which is true; it will not be uninteresting, to conclude our inquiry with some remarks on the important subject of prejudice, or belief in absurdities. When an association of ideas, is not conformable to the nature of things, it constitutes a falsehood; and when a false association has acquired sufficient energy and coherence to excite belief, it forms a prejudice in the mind in which it has attained this power. When a probability is believed with a degree of assurance, which correct experience would not produce, it is proportionally a prejudice; and the complex conception in which there is an undue degree of feeling, must be termed a sentimental prejudice.

The combinations of ideas, which necessarily result from our sensitive intercourse with nature, are generally correct; whilst the complicated conceptions formed by the speculative powers of the mind, and instituted by human education, are more frequently prejudiced and untrue. To enumerate all the sources of belief in absurdities would be an endless task: inaccurate perception; erroneous memory; mistaken causation; sophisticated demonstration and synthesis; imperfect analysis and induction; are radical and copious sources of prejudice. Passing over these, I shall make some remarks on two others, enthusiasm and authority, which are more extensive and baleful in their operation.

An enthusiastic temperament enables all the sentiments of the mind, to exert a preternatural influence on the operations of the understanding. The natural correspondance of temper and belief has frequently been the subject of attention in the present inquiry. The predominating passion of the mind, restrains our ideas to the subject by which it was excited, or to which it is congenial, and communicates to them its energy by unity of excitement and association. When it becomes enthusiastic, it must consequently tend in a powerful manner to the production of belief.

When a subject that is singularly marvellous, great, and interesting to man; as some cardinal and consequential mystery in religion; is contemplated by an enthusiastic person, it inflames the natural vehemence of his temper, fills the whole attention of his mind, and excites the most vigorous conception, and energy of thought. In this state of intellect, whatever is plausible, desirable, or supported by the least authority, in the subject of contemplation, must unavoidably be conceived with credential energy of conception. And thus any doctrine or fact, which excites great emotion; which is congenial to the temper accidentally prevailing; or which is simply desired to be true; is readily embraced, by an enthusiastic person, as an indubitable certainty. And hence enthusiasm of temper must always be a copious source of prejudice, particularly in the interesting and doubtful topics of morality, politics, and religion. But the falsities which thus obtain belief, are naturally circumscribed in their sway, to the few individuals whose temperament and circumstences favor their reception: the baleful assistance of authority, in the form of parental inculcation, is necessary to give them general currency and entail them on posterity—to diffuse and perpetuate the destructive, paralysing, dominion of prejudice.

Our faith in human testimony proceeds from our experience of its truth; and is acquired in our earliest infancy. The child is no sooner able to understand the words, gestures, and actions of its nurse and mother, than it perceives their conformity to the nature of things. The instances of their deviation from truth, which it is able to detect, are extremely few, and must be proportionally impotent in the establishment of an association. In the domestic society of the most worthless of mankind, veracity is respected and practised; the purposes of society cannot otherwise be effected; even its existence must depend on the practice of truth; and if in some instances deception should be used, it must generally elude the sagacity of an infant. Consequently as we learn to understand the natural and artificial language of our species, it must become associated, in our minds, with the truth of the ideas and sentiments it conveys. The declaration of any fact or opinion by a human being, must habitually appear to us, to be the natural effect of discovering its truth: and our external observations, by which this habit is generated, will be reinforced by our internal experience; for incapable at this age of digesting a scheme of deception, or of wandering in the regions of fancy, we cannot experience an inclination to the practice of lying.

The association of truth and human testimony, which is thus so early and firmly established, produces that credulity which is characteristic of the infant mind. Nor does the association at first extend to human testimony alone, but to language in general. At a certain period in early infancy, mere words, abstracted from every credential circumstance, appear to be capable of exciting the ideas they express, with credential energy of conception. The connexion of words and ideas, is at least much firmer in early infancy, than at any later period. As soon as a child has learnt the use of language, we find it continually expressing its crude thoughts aloud to its companions, or whispering them to itself; and every adult whose mind has been cultivated, can recollect that words were formerly more indispensible than at present, in the operations of his understanding.

To suppose, that a child could learn the language of his companions, without experimentally acquiring a great degree of confidence in their declarations, would involve a manifest contradiction. For their words could not become associated in his mind, with the objects and ideas they properly express, if not generally employed in their true and proper meanings; that is, if his companions did not generally speak the truth.

THE power of sympathy, strongly reinforces this habitual confidence. produced by the integrity of domestic and infantile society. When a child has imbibed the sentiments, the enthusiasm, of his parent, he conceives the ideas that are inculcated, with a degree of energy to which they could not otherwise attain.

As we advance in years, we experience more human depravity; the deceptions of the nursery are detected; and we presently extend our views and observations beyond the domestic circle, and discover the ignorance, the credulity, and falshood of mankind. Our faith in human testimony is thus reduced to its proper standard; but this intellectual freedom comes too late; the venom of religious and political bigotry has already corrupted the heart and palsied the understanding. The parent, with baleful officiousness, infused his passions and prejudices into the mind of his infant, at a time when its faith in testimony was greatest. His dogmatic combinations of ideas on interesting subjects, were then conceived with great energy, and being often repeated, have become absolutely indissoluble, and must continue through life to affect the reasoning and conduct of his unfortunate offspring. And thus in the common order of things, the son has inherited the religion and politics of his father in all nations and ages of the world.

In ordinary capacities, all the rational and speculative powers of intellect, are unable to dissever the false associations of interesting ideas, which have been firmly established in infancy. Nor can genius itself always succeed in subverting them. Its characteristic energy of sentiment, peculiarly favors the reception and perpetuity of prejudice. In company with common minds, it has often maintained the most extravagant opinions, of which religion both true and false can afford examples. The mystery of the trinity is contradicted by the intuitive axioms of geometry; yet every grade of intellect in its unregenerate state has believed it, or believed that the words describing it express an incomprehensible truth. The doctrine of transubstantiation is believed by the majority of christendom; yet this barbarous and inconsistent notion, of eating his human flesh and blood, in honor of the prince of peace, is contradicted by the perceptions of sense. Many savage nations have pursued as meritorious the horrid practice of sacraficing their fellow men, on the altar of an imaginary deity. On the whole, there is no association of ideas and sentiments, so barbarous and inconsistent with nature, that it may not be established in the infant mind, by enthusiasm and authority, with all the firmness of intuitive truth. Parents should hence be extremely cautious in the doctrines they inculcate on their children; and we should all be extremely sceptical with regard to the dogmas derived from the barbarous ages of antiquity.

But if enthusiasm and authority combine to produce and perpetuate prejudice, we may congratulate ourselves, that they are not less powerful in the cause of truth, and that even many sentimental prejudices, which they establish, pre-eminently contribute to the happiness of individuals and the prosperity of nations. In the present state of the human mind, civil society could not exist without sentimental prejudices, which systematise and enforce the practice of morality.

CHAPTER XV.

CONCERNING VOLITION.

HAVING discussed the principles of association, of temper, and belief, we shall now proceed to develope their agency in the intricate process of volition. We expect to prove, that they are the radical constituents of the human will, or the voluntary actions of man.

VOLITION has commonly been considered by metaphysical writers, as consisting in the exertion of an innate power, or constituent faculty of the mind, denominated will, concerning whose intrinsic nature it is fruitless and unnecessary to inquire. These writers have manifested on all occasions, an extraordinary propensity to refer every process of the mind, to the agency of some simple and elementary principle, which they denominate a faculty. This practice is extremely baneful to the progress of metaphysical knowledge.

WHEN the explication of any mental transaction is required, it is extremely easy for the grave infallible metaphysician to affirm, that it is the immediate operation of a simple and fundamental faculty of the mind. This specious and delusive answer, allays the unscrutinising curiosity of a common enquirer; and is peculiarly grateful to the general vanity and indolence of mankind; for it seems to confer profound wisdom without labor, and excludes at once the necessity of greater research, and the possibility of higher improvement.

All our researches indeed must terminate in first principles, which human genius shall be unable to simplify or explain; but in sciences which are known to be capable of much improvement, nothing should yet be considered as simple and fundamental. When we have arrived at any general principle in metaphysics, in their present state of imperfection, it is presumptuous to conclude, that it can never be resolved into another more general and elementary. When we have classed a number of similar actions together, and termed them voluntary, we are not yet authorised to suppose, that the common principle on which they depend is simple, and incapable of analysis or explication. There is perhaps no property in the mind of man, which can be denominated a faculty, according to the common meaning of this term in moral science. At least we are yet unacquainted with any, except the powers of perception and association, which have any plausible pretensions to this character; and it is improbable that future discoveries will not rather diminish than increase their number.

In the very commencement of true philosophy, the method of explaining every thing by specific faculties, was exposed and ridiculed by Locke; yet the practice has continued to the present age, and is still increasing. Every popular writer and teather in the moral sciences, has come forward with an apparatus of faculties, more numerous and complicated than the system of his predecessor. They seem entirely to have forgotten, that philosophy consists, not in multiplying, but in simplifying general principles. Their course would seem to prove, that moral science has been retrogressive since the age of Locke. It has indeed been much improved in detail, by recording accurate observations, and ascertaining insulated principles; but in system the common mind has at least been stationary. According to this popular mode of philosophising, every active verb in the english language, to which mind can be the nominative, should indicate a particular faculty, which performs the action affirmed.

It requires no deep research to prove, that volition does not consist in the operation of any simple constituent principle; but is an acquiremet, made at the expense of much labor. That it is altogether factitious, is a matter of fact obvious to our senses. In the infant there is no trait of voluntary power. It has no command of a single muscle in its body, except through the medium of what has been denominated instinct. It cannot raise its hand, nor point its finger, by any premeditated effort of its mind; and it is equally incapable of rational thought, in which the will is supposed to be concerned. Very early in life it may feel desire and be able to prefer; but neither preference, nor desire, alone constitutes volition. Where then is the constituent principle of its mind, termed will? The essential faculties of perception and association, very early manifest their existence. As soon as the infant is born, it begins to perceive, and to associate its actions. But months elapse before it appears to exert any attention, or to attempt any voluntary motion: and when it does commence, all its first attempts are crude and abortive. After a year of indefatigable labor, it begins to produce and controul the action of its limbs, and the current of its ideas, with some degree of certainty and effect. And every subsequent year to the decline of life, the strength of volition, and the extent of its agency, are continually augmented. But the innate powers of perception and association, regularly decline through every stage of the same period. The least attention to fact, must consequently convince us, that volition is an acquirement.

I WOULD define volition to consist in the association of a muscular action, with an energetic conception of that action. and a predominating desire to perform it. This definition may perhaps appear obscure; it probably requires explication—In every process of volition then, we discover three principal and essential parts; an idea of some action to be performed; a desire of performing it; and ultimately the action itself. The idea of the action, and the desire of performing it, are collateral but not necessarily associated motions; and they are antecedent to the occurrence of the action itself, which always finishes the process. The antecedent idea and desire have not generally, I believe, been considered as integral parts of the volition, our attention in contemplating this subject being naturally attracted to the muscular motion, which seems to be produced by a specific effort of the mind.

To explain the manner in which this ultimate and conspicuous item is produced, is the desideratum in this inquiry. Our theory affirms, that it is excited by a consecutive association with the concurring idea and desire of its performance, which are constantly observed to precede it. To establish this point, it will be necessary to demonstrate, that in all our voluntary movements, an idea of the motion to be performed, is first conceived with that degree of energy which constitutes belief; that this idea becomes connected with a predominating desire to perform it; and that the motion itself is then produced, by a consecutive association with this concurrence of the energetic idea and desire of its performance. It will thus be established, that the process of volition embraces all the principal kinds of excitement, sentimental, ideal, and muscular. The sentiment and the idea being synchronously conceived, with the energy of temper and belief, produce the muscular action by a consecutive association previously established. And thus all our voluntary actions are produced, by the agency of temper, belief, and association. No specific faculty is exerted; no particular effort is made; the whole consists in a complicated process, or combination of the ordinary modes of excitement. A common association is much more simple and precise. The antecedent link introduces with facility and certitude its collateral or consecutive associate. No particular degree of energy; no attention of the mind; no concurrence of dissimilar and unassociated excitement, is necessary to produce the ultimate effect. In volition, the excitation of the ultimate part, requires the concurrence of a predominating idea and desire, which are not associated, and which necessarily excite the attention of the mind, Having thus diffusely explained the subject, we may now proceed to its demonstration.

THAT in every volition, there is an idea of the action to be performed, and a desire of performing it, antecedent to its actual performance, is a fact which must be ascertained by observation, not by argument. I may therefore be concise on this point. Every person who is capable of consciousness and memory, must immediately assent to this proposition, that no voluntary action can be performed without its preconception in the mind. To act without knowing what we do; without any notion of the manner, and consequences of our activity; is not volition but habit, instinct, or delirium.

IT is equally obvious, that we must not only have an idea of the action, but a desire to perform it. Simple desire, and the sentiment of an effort, which we experience in volition, are quite different things; and the former constantly precedes the latter. The sentiment of preference or desire, does not constitute a voluntary exertion, but is clearly essential to its commencement. We cannot will without a motive; without a desire of something to be accomplished. It appears to me, that no one can dissent from this statement, except through intuitive prejudice, or a total inability to observe and reflect on the transactions of his own mind; and discussion with such a person would be entirely insignificant.

But it is not every mode of conception, nor every degree of desire, which can produce the muscular action in a voluntary movement. I may at pleasure conceive any action, which a man can possibly perform; and I may earnestly desire to perform it; and yet not move a single fibre for attaining its completion. In a public assemby, I may form a very clear conception of kissing the beautiful lady who sits near me, and ardently desire to do it, without any tendency to its actual performance: for I may consider such an action to be impracticable, on account of the resistance which the lady and her friends would make; or my sense of decorum, my desire to conform to the fashionable rules of politeness, may be stronger than my desire of kissing her, and consequently restrain me from attempting it. When a man is confined for debt by the laws of his country, he can conceive the design of approaching the door of his prison, of forcing the lock, and regaining his liberty; and he may ardently desire to perform this series of actions: but if he also considers that his project is impracticable, because the strength of the lock exceeds any force he can apply to it; or that if accomplished, it must ultimately prove unsuccessful, because the officer of justice would again seize and imprison him; or although it be practicable, successful, and desirable, yet he may consider, that the law itself will shortly discharge him and guarantee his liberty, and he may therefore prefer a temporary confinement to the precarious enjoyment of personal freedom; in all these cases he will not move a muscle to perform the action he has conceived and desired.

It is consequently evident, that before we can perform any voluntary action, we must clearly conceive the manner of its performance, believe it practicable in itself, and ultimately successful, and feel in its desire more energy than in any contradictory sentiment. The desire and the idea must thus be conceived with the energy of temper and belief; they must predominate over all contradictory sentiments and ideas; and as soon as they attain to this predominance, they directly excite the proper muscles by an association previously established. We shall now attempt to illustrate this process by an example of the manner in which it commonly transpires.

When I am hungry, and see delicious fruit on the tree standing near me; I desire its application to my palate, as an event that will excite pleasurable sensation, and remove the uneasiness of hunger. To effect this purpose, a series of intermediate actions are necessary. All my ideas of causation, which connect my present state with the desired event, are immediately suggested to me, by the similarity of their nature, or by associations previously instituted. And thus I presently conceive a series of operations, terminating in the enjoyment of the fruit, whose coherence with each other in the order of causation, induces me to believe in their practicability and success. By attaining to this belief, my ideas of the actions to be performed, become strongly connected, through the event they produce, with the desire which that event had previously excited, and which is therefore now transferred through this association to the actions themselves. And if my persuasion of their success be clear and strong, and my desire energetic and unalloyed; if they constitute the temper and belief of my mind; they unavoidably excite me in an instant to the primary movements.

In this process, we first conceive some pleasurable object, which excites in us the desire of enjoying it; we then imagine a train of action, which by its connexion with the enjoyment of that object in the order of causation, attains to the energy of belief; and we lastly transfer the desire of the enjoyment to this associated train of action, and thence immediately begin its performance. If the actions imagined do not clearly connect us, in the order of causation, with the enjoyment desired, they cannot be conceived with the energy of belief, and we continue inactive—we deliberate—we revolve and compare all our ideas relating to the affair, till a connexion is discovered, or perceived to be impossible. Or if the desire itself be not predominant; if any other object repress it, by raising a domineering rival; the mere practicability and success of the actions alone will be insufficient to move us. But the instant that the idea and the desire both become predominant, our inactivity is rendered impossible.

We shall now attempt to explain, in what manner all our muscular motions denominated voluntary, have become associated with the concurrence of the energetic idea and desire of their performance, by which we discover that they are constantly preceded and apparently produced. If we can ascertain, in the common experience of mankind, sufficient causes for the establishment of this association in every case of volition, we will be authorised to conclude, that it has been established and is the true source of all our voluntary muscular actions. To show in what manner we might naturally acquire all our knowledge, was deemed by Locke to be a sufficient argument against innate ideas: to show in what manner associations must have been formed sufficient to produce all our voluntary actions, must likewise disprove the existence of any innate simple faculty destined to perform them.

It will not be difficult to demonstrate the associate nature of those voluntary actions, which are learnt after we attain to the perfect use of attention and memory; for the circumstances attending their acquirement have been noticed and remembered by us all, and will enable us to ascertain the nature of the process, which they have conspired to establish. But anterior to this period, we acquire the power of producing the voluntary contraction of every muscle, which is afterwards employed in any complicated voluntary movement. When the infant is born it is entirely destitute of volition; it presently acquires some command of its muscles, and is enabled to perform some simple motions, the rudiments of further acquisitions; it thence gradually compounds these elementary parts into more complicated movements, until it has acquired the facility and amplitude of motion, which are found in the adult and the experienced artist. It is difficult to demonstrate the formation of these earliest rudiments of volition, which were instituted before the oldest records of memory. The analogy of later acquisitions should be deemed sufficient to establish their associate nature; we will attempt however to demonstrate it in a direct manner.

The human system in its infancy is characterised by an extraordinary degree of mobility. Every fibre, and every organ of sense, is extremely excitable. The great irritability of the muscles may be inferred from the extreme propensity to motion. Hence the common sensual impressions, to which the infant is unavoidably exposed, produce excessive action in its organs of sense, and by unity of excitement, keep its whole system in activity and agitation. Even a moderate excess of stimulus will cause painful and convulsive excitement. The irritation of worms and of acidity in the intestinal canal, the pain of teething, the pressure of clothes, even the pricking of a pin, will frequently excite the most violent convulsions. And thus the painful sensations, which are excited directly by external causes, aided by the irksomeness of inactivity in irritable fibres, produce an incessant train of motions in the limbs of every infant. These motions by expending its excitability in muscular excitement, by changing the posture of its body, or by attracting the attention of its nurse, commonly procure relief from the pain which produced them. The natural desire of this relief, and of pleasurable sensation in general, will presently be transferred by association, to these objects by which it is visibly accompanied and procured; and the motions of its limbs, with the assistance of its nurse, will thence be desired by the infant, as often as it feels any want or uneasiness.

It thus appears, that the irritations which excite the first muscular motions of the infant, at the same time originate a predominating desire, which presently becomes associated in its mind with its ideas of those motions, so as to render them its principal object. Hence the actions of an infant very early become accompanied by the desire of their performance, conceived with a degree of energy exceeding all contemporary sentiments: and they are also accompanied by a perception of their occurrence; for the infant cannot move without perceiving its motion. Our involuntary infantile motions, are therefore very early accompanied by an idea and desire of their performance, conceived with the energy of temper and belief. Infancy is also the peculiar season of association. Is it then possible, that these constantly concurring motions; the muscular action, and the predominating idea and desire of its performance; shall not become associated together? It is not; and in this way all the simple actions of our muscles must evidently become associated very early in life, with the energetic idea and desire of their performance, and afterwards be constantly excited by their concurrence.

Whatever ideas are intimately conjoined by association, must necessarily correspond to a common sentiment. Those actions therefore, which the infant learns by experience, to associate in the order of causation with some agreeable event, must soon become desirable for this effect which they produce; and they will thence be performed with a view to accomplish it. And thus the voluntary actions, which were first performed for the immediate removal of uneasiness, will presently be employed for the attainment of distant pleasure, and will continually become more extensive in their use, and familiar in their performance.

The origin of the first rudiments of volition, may hence be conscisely explained in the following manner. 1. Various painful impressions on the irritable system of an infant, produce at once the desire of ease, and the motions which tend to procure it. 2. These motions thence become by association the object of the desire, and at the same time excite a perception of themselves; they must consequently in general be occompanied, by the idea and desire of their performance, conceived with predominating energy. 3. This general conjunction of the muscular action, with the energetic idea and desire of its performance, associates it with them, and renders it causable by their future concurrence. 4. When therefore, experience has associated the infant's ideas of personal exertions, in the order of causation, with the attainment of any agreeable object; the perception of that object must revive the energetic ideas and desire, with which the actions necessary for attaining it are associated, and thus impel him to its voluntary pursuit.

The same experience, that associates the muscular action in a process of volition, with the concurrence of its energetic idea and desire, also associates that idea and desire with each other: so that the conception of any voluntary movement of its own person by an infant, immediately revives the dsire of performing it. This association of the antecedent items, in conjunction with the great mobility of the system at this age, produces the indefatigable activity and restlessness, which are characteristic of youth. As soon as the first rudiments of volition are instituted, the recurrency of the infant's ideas of its own actions, continually excites the desire of performing them. and thence their performance. And thus it is incessantly engaged in the repetition of all the voluntary motions it has learnt. The irksomeness of inactivity, to which this restless agitation has been referred, consists chiefly in a comparative uneasiness, accompanying the inoperative conception and associated desire of some voluntary action.

ALL the trivial and inconsequential actions of boyish play, are performed in consequence of this association. When the child rises in the morning, its system is extremely excitable, and naturally predisposed to the reception of pleasurable sentiments. The circumstances of its situation, presently suggest to its vacant mind, the idea of some voluntary movement; and that idea, however trivial the action may be, immediately revives the associated pleasurable desire of performing it, and the action is thence instantly performed. And in this manner, all its vacant moments are employed on trivial purposes, until fatigue suspends its operations. And we hence discover the chief and radical source of the pleasures enjoyed in playful exercise. They proceed from that associated desire of muscular action, which occurs in the first rudiments of volition.

THE principal check upon this regular repetition of our voluntary actions, as often as they are conceived, is the want of controling energy in the desire they revive; which is at first accidental, and finally habitual. The force of the associated desire is originally so great, that the infant is only prevented from performing every action he conceives, by its manifest tendency to produce pain; or by the superior attraction of some other object; either of which must supplant the desire of the action conceived. But as he advances in life, this desire is gradually enfeebled, and finally reduced to impotence. The original involuntary motions, by which the first rudiments of volition were established, commenced in pain and terminated in pleasure, in consequence of which, their ideas in the mind became associated with pleasurable sentiments. But when they become voluntary, and are reiterated in childish play for the pleasure they afford, their sentimental tendency is reversed. They now commence in pleasure, and generally terminate in the pain of fatigue, by which their associated pleasure in the mind must gradually be subverted. And this subversion will be rapidly completed, by the performance of mechanical labors and exertions, which become extremely disagreeable through fatigue, or the repulsive circumstances attending them. Hence in the adult, and particularly in the aged, the conception of voluntary actions rarely excites a predominant desire to perform them, unless they be connected with some desirable event in the order of causation.

If this exposition of the manner, in which the rudiments of volition are instituted, by the common experience of infancy, should be deemed inconclusive; an examination of the procedure, by which a voluntary movement is learnt by an adult, will certainly be sufficient to establish the associate nature of volition in general.

When a father wishes to teach any mechanic art to his son, the first object is to inspire him with a desire to learn it. As soon as the youth has acquired this desire, his next labor is to gain a clear idea of the manuel motions in which the art consists. For this purpose he attends to the verbal instructions of his teacher, and carefully observes his movements in the practice of the art. Having thus obtained a clear idea of the action, which he belives to be practicable, and an energetic desire of performing it, he proceeds to attempt its execution. His first efforts are unavoidably crude and abortive; for his muscles, obedient to the general idea and desire of their contraction, have not yet been associated with precision, to the complex idea which is now to direct their operations. By various attempts he discovers the proper mode of action, and by repetition renders it familiar, or associates it with precision to its idea in his mind and the concomitant desire of its performance. This is the process invariably pursued in learning a voluntary action; and it plainly consists in associating the muscular contractions, with the predominating idea and desire of the motion proposed.

It is impossible to evade the conclusion, established by this experimental argument, unless we maintain, that the predominant idea and desire excite an effort of the faculty termed will, and that it is with this effort, that we connect the muscular action by the principle of association. But we are not to suppose supernumerary causes. The muscular action may as well be associated directly, with the concurrence of the energetic idea and desire, as with an effort of the will excited by that concurrence. The supposition which maintains the latter, is complicated and unphilosophical, and is not to be preferred to simplicity and experiment. But they who believe in a simple faculty of this kind, are perhaps ready to decide the question by affirming, that they are *conscious* of its existence. It will therefore be necessary to examine the nature of this consciousness on which their belief is founded.

NOTHING can be more clear and certain than this; that before we can perform any voluntary action, we must have an idea of that action, and a desire to perform it; and that volition is therefore governed by motives. Yet a popular and able moralist in the faculty school, apprehensive for the tendency of this doctrine, has gravely affirmed, that he was intuitively conscious of entire freedom of will. To me nothing appears more immediately dangerous, than this freedom which has been so eagerly defended. Convince me, that there is a faculty in my mind, which is the source of all my actions, and that it is subject to neither sentiment nor reason, and I shall live in continual dread of ruin. If my will, the radical source of all my conduct, is so entirely free, that it can neither be excited by the anticipation of pleasure, nor restrained by the apprehension of pain, how shall I be certain, that it will continue to actuate me in the pursuit of happiness, and not this *instant* dash my head against the wall, or drive me headlong into the fire. To be conscious of a will however, is less absurd than to be conscious of its freedom: for in every process of volition, we clearly experience the sentiment of an effort, or animal exertion, which may be mistaken for the act of such a faculty.

THAT of which we are conscious in this case, is purely sentimental: it is a peculiar feeling, which from its visible effects we denominate an effort, or exertion of mental and animal strength. Scrutinise the subject as much as you please, and you will find, that after the idea and desire of the action, you are conscious of nothing but this peculiar sentiment. We affirm, that it is caused by the association, which excites the action of the muscles. The moment when the idea and desire have arrived at the acme of their strength, the sensorial excitement descends by association into the muscles to be moved; and it is this forcible determination of the energetic action in the sensory, which excites the peculiar sentiment of an effort then experienced. The objection to the present theory supposes on the contrary, that this sentiment is excited by the concomitant determination of a supposed faculty called will. Our explanation is the most simple, and consistent with fact and analogy; and is fully established by the following considerations. In certain irritable states of the system, if a strong irritation occur in any excitable part, it passes to the sensory, and is thence reflected into the irritable muscles, producing a convulsion. In this case we are conscious of exactly the same sentiment, that we feel in common volition; though we endeavor to refrain from the exertion by which it is caused. We must therefore be conscious in this instance, of an effort of the will to perform a certain action, and of another to refrain from it at the same time. Every one then who has experienced this sentiment of an effort, in consequence of an involuntary straining, must be ready to declare, that it is not produced by an effort of the will, but is caused by the determination of sensorial action into the muscular system.

We are conscious of a similar, but less energetic sentiment, accompanying the association of ideas in the order of causation. And it is this sentiment, as we recognise it in contemplating a train of causation, that Mr. Hume has demonstrated to be the principal item in that conception of the mind, which is signified by the word power. He considered the sentiment of a nisus, which we feel in volition, as chiefly composing the vulgar notion of power; whilst he viewed the sentiment, of which we are conscious in the transition of our ideas in the order of causation, as its true philosophical conception. But in both cases the sentiment is the same; it is only more vivid and energetic in volition, and different in its ideal associates. Probably the same feeling might be experienced in every case of consecutive association.

An argument for the present theory, may be drawn from the facility with which voluntary actions pass into simple associations. Every voluntary operation, when first acquired, consists of various subordinate parts, which must be conceived and desired by the mind anterior to their performance. By much practice these parts become connected by consecutive association, and succeed each other without any attention of the mind. It is then only necessary, that we should revive the first link of the train, by conceiving and desiring the event which it tends to produce. Even in the simplest rudimental volitions of infancy, we do not conceive and desire the contraction of the muscle, but the motion of the limb, its effect; and the more experienced and adroit we become, the more distant and simple is the event we conceive and desire.

In the process of volition we experience the highest grade of excitement. The idea of the action must be conceived with that degree of energy, which produces assurance; and the desire of its performance must predominate over all contemporary sentiments, which are not congenial to its nature. The concurrence of these energetic actions in the sensory, determines the sensorial excitement into the muscular system by association, and thus diffuses and augments the energetic exertions. Hence we may understand, why our voluntary actions are so fatiguing; and why their performance diminishes our sensations of pleasure and pain. In volition the sensory is surcharged with excitement: its action is superabundant and diffusive. All its departments are occupied by the energetic conception of the ideas and sentiments, which are constituent parts of the voluntary transactions; and from them a train of association is incessantly descending into the muscular system. An ordinary sensation in the organs of feeling, must consequently be unable, to revert the strong current of voluntary excitement, and supplant it in the attention of the sensory; and must therefore be entirely disregarded by the mind.

WE may conclude the present subject, by making some remarks on the voluntary powers of the understanding. Reasoning, judgment, imagination, are supposed to be faculties of the mind, which perform their functions under the direction of the will; or the will is supposed to have dominion over the ideas of the mind, as well as the muscular actions of the body.

WHETHER the present theory of voluntary actions be true or false, it may easily be shown, that there is no process of volition in thinking, similar to that which occurs in our muscular movements. Before we can perform any personal movement, it is absolutely necessary that we should have some idea of the motion, and a desire to perform it; but nothing similar to this can occur in operations purely mental. In them a preconception of the action to be performed, must be the action itself. If therefore we exert volition on our ideas, we exert it at random; for we can have neither prescience nor desire of the effects it may produce: but that process in which neither foresight nor desire can occur, cannot properly be denominated volition.

WE may observe, with regard to the operations of the understanding in general; that we can imagine with ease a great many events, which can be effected only by the internal action of the mind. When such an event, as the demonstration of some theorem for instance, is conceived and desired with energy, the mind directly proceeds to accomplish it, not under the direction of a will, but of the common laws of sensorial excitement. The desire itself is naturally permanent, and restrains the attention of the mind, and the current of its ideas to the topic contemplated. In obedience to former habits and associations, and to the principles of sensorial excitement, all its correlative ideas successively recur to the mind, till the proper combination is conceived, or through weariness we desist from the labor. We doubt not, that every mental operation, which is now referred to the agency of a simple faculty, might be shewn to consist in a process depending on the common laws of sensorial excitement and association.

APPENDIX.

No. 1.

ADDITIONAL REMARKS ON ASSOCIATION.

THE metaphysicians, who have written against the philosophy of Hume, have contended; that experience, habit, or association of ideas, cannot be the cause of our faith in human testimony, nor of the inference founded on causation. For the infant is observed to be extremely credulous, and to infer effects and causes from each other, at an age so early, as they suppose, that habits of this kind could not previously be established. When discussing these topics, we attempted to prove, that the association of our ideas in the order of causation, and the habit of confiding in human declarations, are necessarily among the earliest acquisitions of infancy. The following experiments are intended more fully to confirm these positions; to shew with what quickness and ease associations may be established; and to illustrate the extensive and important agency of this principle in human nature.

1. The familiar experiment of turning on the heel till giddiness occurs, is an instance, in which a particular habit of muscular action is very speedily established. While turning from left to right for example, the eye is gradually turned to the left, for the purpose of retaining its view of the object on which it is fixed. When that object has passed beyond its reach, it is turned to the right by a quick motion, and fixed on the object before it, which it again follows slowly to the left. And this rolling of the eyeball, slowly to the left and quickly to the

right again, continues all the time the gyration is performing. Before the giddiness occurs, the muscles moving the eyeball have acquired a habit of acting in this manner; so that they continue inconsciously to us, when we stop, to turn the eye slowly to the left and quickly again to the right. The objects we now behold, must consequently appear to us to revolve from the left to the right, or in a direction contrary to that in which they had previously seemed to move, as every person has experienced to be the fact. When my friend made this experiment, I observed the rolling of his eyes to be, as here described, slow to the left, and quick to the right. When I performed it myself, I distinctly observed that the objects before me seemed to revolve in both directions; their motion to the right was comparatively slow, and their return to the left almost imperceptibly quick. In turning round with the eyes shut, the same habit is generated; for in this case we habitually direct the eye to the supposed positions of the objects around us, as though we actually perceived them. In the following experiment a similar habit is instituted in our sensual excitement.

2. Place yourself near a swift brook, or narrow current of water, whose motion is very obvious, and fix your eyes for a few minutes immovably on a stationary point in the current or near it; then transfer them to another object, and you will perceive a tract on its surface, corresponding to the current, which seems to move in a direction contrary to that of the current. This experiment will succeed best, when the system is debilitated, and the nerves are predisposed to giddiness.

In this case, the different parts of the retina, being excited in succession from one side to the other, by each visible item in the current, become consecutively associated in all their actions. If an impression be now made on any point, the action resulting, or the spectrum it leaves, must consequently progress in the direction the current had pursued. To understand, how this habit originates the idea of motion in the present example, it is necessary to reflect; that in the ordinary perception of a moving object, the spectra of the preceding parts are constantly supplanted by the impressions of those which ensue; and that the direction of the motion conceived, is from the impression to the spectrum it supplants. The same things must occur in the perception of a stationary object, when this habit inconsciously prevails in the retina. The actions excited in every point by the stationary impression, will be constantly passing off in the direction the current had pursued; and in their progress, they will as constantly be arrested or supplanted by the impressions before them; and thence the object will necessarily be conceived to move, to that side of the impression on which it meets the spectrum, or in a direction contrary to that of the current by which the habit was instituted.

When we turn round on the heel, with the eyes fixed on a point directly over us in the ceiling, an association of this kind is established; so that on stopping and looking horizontally, all the objects of sight seem to revolve round the axis of vision.

The person who will candidly consider the result of these experiments, will not hastily decide, that in the history of the human character, any period can be assigned, too early for the previous institution of irresistible habits. In these instances, habits both in muscular and in sensual excitement, are established almost instantaneously with great firmness. They are indeed not permanent; but the reason is obvious: they are wholly inconsistent with the human character, and the unceasing transactions of human life. If they were consonant to the structure of the system, necessary in the performance of its ordinary functions, and incessantly confirmed by a repetition of the experience by which they are instituted; it is evident, that they must become in a few days or even hours, not less firm and efficient, than those early and powerful habits, which have improperly been denominated instinct.

No. 2.

CONJECTURES ON THE PHYSIOLOGY OF THE BRAIN.

THE opinions delivered in this work, with respect to departments in the sensory corresponding to the organs of sense, were deductions from the established laws of excitement and the conscious operations of the intellect. They were inferred and adopted, without the least regard to the anatomy of the brain, in which they should be verified. On reviewing this anatomy, since the preceding chapters were prepared for the press, it appears obvious to me, that the remarks they contain on this subject, may also be satisfactorily proven by anatomical specifications.

1. The optic thalami, in which the optic nerves chiefly terminate, or from which they principally rise, are evidently the sensorial departments, that reiterate the sensual actions of the retinas, or in which the visual ideas of the mind are conceived.

2. Second and third portions of the optic nerves, terminating in the tubercula quadrigemina, point out these small bodies, as supplementary departments to the optic thalami.

3. The whole hemisphere of the cerebrum, excepting small parts appropriated to particular uses, constitutes the sentimental department, which reiterates all the sensations, and perceptions of touch, throughout the whole system. To these sentimental departments, the lobes of the cerebellum, and the corpora striata, are supplementary, like the tubercula quadrigemina to the optic thalami.

4. The hemispheres of the cerebrum, with their supplementary departments, communicate through the crura cerebri, the crura cerebelli, the medulla oblongata, spinal marrow, and nerves into which these parts are ramified—through all these, they communicate with every fibre in the system, and thus receive its peculiar sensations, and the perceptions of touch from the external surface. Through these sources the sensations of taste are also transmitted; but those of smell are conveyed direct-

ly by the olfactory nerves, which terminate, by three divisions, in the anterior lobes of the hemispheres, in the corpora striata, and in the corpus callosum, through which the nasal sensations are probably conveyed to the cerebellum, or second supplement to the sentimental department.

5. The perceptions of sight are unitised, by the similarity of the impressions on the retinas, and by the union of the optic nerves in their passage to their departments: and the ideal conceptions of the optic thalami, are unitised by habit, and by their communication through the commissura mollis.

6. The sentimental actions of the hemispheres, and of the corpora striata, are respectfully unitised, or at least harmonized in their tempers, by their communications through the anterior commissure, and the corpus callosum.

7. The perceptions of touch, or the mathematical ideas derived from this source, are conceived in the sentimental department, in combination with the sentimental excitement, which originally accompanies them in their sensual organ; in the same manner as the mathematical ideas acquired by sight, are always intimately combined with colour whenever they are conceived.

8. Through the crura cerebri, &c. the excitement of every department in the sensory, is occasionally transmitted, by a train of simple association, or a process of volition, to every muscular fibre in the body, or at least to all the locomotive muscles, by which the voluntary motions are performed. It is probable that these descending trains, and the trains of sensation ascending through the same channels, are conveyed by different fibres in the same nerve: on which account it may be, that nearly all these nerves are divided into two or more fasciculi at their origin.

9. The reason why the sentimental department is so large, is that it corresponds to the sense of feeling, whose organ is the whole system: and its largeness is also necessary, on account of all our voluntary movements, and muscular actions in general, being derived from its excitement. This is proven, by the force of our exertions

always corresponding to the strength of the antecedent sentiment or desire, from which they proceed by association. The concurring idea merely directs the current of sentimental action to the proper muscles.

10. The object to be accomplished, by the tripple apparatus of sensorial departments, corresponding to the same organ, can only be understood by recurring to a fact in the history of mental operations. Every person may daily observe, that he can carry on a series of transactions, by the agency of his senses and muscles of locomotion, without a lively and conscious attention to what he is doing; and at the same time attentively pursue a train of thought, wholly unconnected with the business in which he is engaged. To explain this fact was extremely difficult, until the anatomical inspection of the brain, demonstrated the existence of supplemental departments; for it was obvious, that while the organ of sight was attentively perceiving the objects around us, we could not at the same time attentively conceive other visible ideas in the department repeating its actions. But there being separate departments corresponding to the same organ, one of them may reiterate its sensations and perceptions, or co-operate with it in these actions; whilst another conceives distinct sentiments and ideas originally derived from the same source. Thus, whilst the optic thalami, and the corpora striata, are exclusively occupied by visual ideas and their corresponding sentiments; the tubercula quadrigemina, and the hemispheres of the cerebrum, may be co-operating in the perceptions of sight, and the predominant sensations in the system, and transmitting them to the muscles to produce voluntary and associate motions. It is in this manner, that I preserve an erect posture in my seat, or walk through my room, whilst attentively contemplating this subject.

11. It was perhaps not absolutely necessary, that there should be two supplemental departments; but nature often seems to employ a superfluity of means, when any important object is to be effected; and none could be more important, than that which is thus accomplished. Man would indeed be a contemptible being, were he un-

able to perform a great many personal transactions, required by the incidental circumstances of his situation, without devoting the principal attention and operations of his intellect to their performance. These personal transactions must also be so incessantly reiterated in our waking hours, that different parts were perhaps necessary for relieving each other when fatigued in performing them.

12. The inferior, posterior, tubercles in the quadrigemina, and the lobes of the cerebellum, appear to occupy the second rank in the supplemental departments; and that they may co-operate with each other, they are connected together by the valvola vicussenii, a medullary substance stretching from the tubercles to the crura cerebelli: and they have also other connexions less obvious or more circuitous.

13. We have said nothing about the auditory department of the sensory: for the anatomical structure of the brain, points out no part very clearly for this purpose. We can only observe, that the termination of the auditory nerves in the central parts of the basis of the brain, is peculiarly favorable for the association of the auditory actions with the sentiments and ideas of the other departments. There are a variety of parts, distinctly marked in this region, whose uses we shall not pretend to conjecture: some of them may probably be appropriated to auditory excitement.

14. The various distinguishable departments in the sensory, are not only connected together by continuity of substance; but they are also variously connected by peculiar structures, visibly designed to facilitate their communications with each other. Some of these we have already remarked; as the connexions of the corresponding departments in the different sides of the sensory. In addition to these, we may observe, that the thalami and quadrigemina are connected by direct intervening fibres: the thalami are connected to the corpora striata by the tenia semicircularis geminum, a medullary partition between them, which is continuous with their medullary substance: through the crura cerebri, the visual departments are connected with the hemispheres, in a manner

very favorable to the descent of their concurring actions into the muscular system: and the quadrigemina are so connected on either side, that 'they seem to form a kind of commissure' between the hemispheres. The corpora striata are connected laterally, by their medullary striæ, and also by a mass of cineritious substance, with the middle and posterior lobes of the cerebrum. The corpus callosum, and more especially the fornix, through the medium of its anterior and posterior crura and the hippocampi, multiplies and perfects the communicating connexions of distant parts. In short there is no one department, which has not a very direct communication with every other, with which it can be necessary that it should co-operate in the various transactions of the mind.

No. 3.

CONTAINING DEFINITIONS OF THE TECHNICAL TERMS EMPLOYED IN THE PRESENT VOLUME, WHICH HAVE NOT BEEN DEFINED IN THE BODY OF THE WORK.

ABDOMEN. The belly—A cavity between the thorax and pelvis, containing different viscera, called the abdominal.

ACTION. When technically used in this treatise, it is synonymous with excitement.

ALBUMEN. A proximate principle of animal bodies. It is found in nearly every part of the human system. When the blood has coagulated spontaneously, if the watery part, called serum, be heated, or mixed with alkohol, a second coagulation takes place, by which the albumen of the blood is separated in a solid form—The white of an egg is albumen nearly pure.

AMMONIA. An æriform substance, composed of nitrogen and hydrogen. It is the principal ingredient in hartshorn, or the volatile alkaline salts.

ARTERY. A blood-vessel, or conical tube, through which the blood flows from the heart into all parts of the body. From the left ventricle of the heart, one artery, termed the aorta, is seen to rise upwards a few inches, and then divide into two branches; one of which, the aorta ascending, passes on in the same direction, and is ramified through all the upper parts of the body; the other, called the descending aorta, turns down and supplies all the lower parts of the system with blood. From the right ventricle one artery also ascends, and is ramified through the lungs for the purpose of ærating the blood. When the heart contracts and drives the blood from its ventricles into the arteries, it produces that throbbing in these vessels, which is termed the pulse.

ASSIMILATION. To assimulate, literally means to liken, or make similar—It is technically used to signify the conversion of crude alimentary matters into the organic or animal state.

AURICLE. The auricles are two muscular sacks, situated on the basis, or upper and broad end of the heart. The one on the right side receives the blood from the vena cava, and discharges it again into the right ventricle; whilst that on the left receives the blood from the pulmonary veins, and then pours it into the left ventricle. They are closely attached to each other, and to the basis of the heart.

AZOTE. An æreform substance, which, in conjunction with oxygen or vital air, forms the atmosphere in which we breathe. It is now generally called nitrogen; and is more abundant in the atmosphere than vital air in the proportion of three to one.

CALORIC. The element of fire, which is now generally believed to be a solid substance. It combines chemically with all the material elements of nature; and is then said to be latent. When uncombined, it penetrates the pores of all material bodies like a fluid, and thus constitutes their temperature, or sensible heat.

CARBON. A simple substance, of which the diamond is a pure specimen. It is a very extensive ingredient in vegetable substances. Combined with oxygen to a certain extent, it forms common charcoal: and combined with a larger portion of the same element, it forms

CARBONIC ACID GAS. An æriform acid substance, composed of carbon and oxygen. and usually termed fixed air, on account of its being developed by different means from various solid bodies. It constitutes the *damps* which are so destructive to animal life in wells and mines. into which it descends by its superior weight.

CELLULAR SUBSTANCE. All the principal and distinct parts of the body, as the bones, muscles, skin, blood vessels and nerves, beside their principal joinings, are connected together on all sides where they come in contact, by a loose, elastic, membranous substance, which, being full of cells, has received the present title. It is most abundant immediately under the skin; but is also an universal connecting medium throughout the whole system, penetrating into every solid part, and connecting its minutest fibrils with each other.

CHEMISTRY. The science, which investigates the intrinsic nature and composition of material substances, and the efficient energies of nature, on which all the phenomina of causation depend.

CIRCULATION. The blood of the human system is contained in the blood vessels, viz. the heart, arteries and veins; through which it is continually moving in the following manner. The heart, being filled with blood, contracts and drives it into the arteries, through which it runs to the most distant part of the body; the arteries then contract and force it from themselves into the veins, through which it returns again to the heart. Any given portion makes this circuit in three minutes on an average. That which is discharged from the right ventricle, passes through the pulmonary artery to the lungs. where it is ærated, and returns again through the pulmonary veins to the left auricle and ventricle: and this is called the lesser circulation. Being discharged from the left ventricle again, it passes through the aorta and its branches, into every part of the body, and returns again through the common views to the right auricle and ventricle, whence it first issued; and this is called the greater circulation.

CRURAL. Belonging to the leg, or lower extremity.

DYSPEPTIC. Subject to indigestion—from dyspepsia, which means an indigestion—or debility of stomach.

ELEMENTS *of Matter.* All material bodies are compound in their natural state; and the simple homogeneous substances, into which they are resolved by chemistry, are termed their elements.

FIBRIN. This is a proximate principle of animal bodies; and is called fibrin, because it is the basis, or principal part, of the muscular fibre. It enters largely into the composition of the blood, being the coagulable lymph, or part which separates and becomes solid in spontaneous coagulation. When freed from the red gobules and coloring matter, it becomes perfectly white.

GASTRIC. Relating to the stomach—as gastric juice, the liquid secreted into the stomach for the purpose of digestion,

GLAND. A small round body, which performs the function of secretion. The glands are very numerous in the human system; and very different in their size and obvious structure. Some are very small and simple; whilst others, as the liver, are large and complicated, being a congeries of smaller glands. Their internal structure is intricate; but they are obviously vascular; and are destined to operate a change on the blood circulating through them, and to separate for some purpose the part they change.

HYDROGEN. A simple, æriform, inflamable substance; the lightest of all the airs, and therefore used for distending baloons. It enters largely into the composition of vegetables, and other substances. In combination with oxygen it forms water.

HYPEROXYGENATE. When any substance is combined with oxygen, it is said to be oxygenated; and when the quantity of the oxygen combined is preteraaturally great, the substance is said to be hyperoxygenated.

INTESTINE. A gut, or portion of the canal through which the food passes, when it leaves the stomach.

IRIS. In the front of the eye, we perceive a circular portion that is always colored. In its centre, there is a black spot or opening, called the pupil, or sight of the eye, which is continually varying in its size. It is surrounded by a broad border, blue, grey, or brown, which makes up the rest of the colored area. This border is called the iris; it is a fine muscular membrane, composed of circular and radiant fibres. By the contraction of the circular fibres, the membrane is rendered broader, and the pupil proportionally lessened or closed; whilst the action of the radiant fibres, contracts the breadth of the iris, and dilates the pupil. And thus a less or greater quantity of the rays of light, is admitted through the pupil to the retina at the bottom of the eyeball; according as less or more may be required for distinct vision. In front of the iris and pupil, there is a transparent fluid, retained in that place by the cornea, a strong membrane, which forms the foremost part of the eye. *See Retina and Pupil.*

LACTEAL. Milkey. The lacteals are fine vessels, by which the chyle is absorbed from the intestines, and carried towards the heart to be discharged into the blood vessels: and the lacteal glands, are the small glandular bodies through which they pass.

LIVER. The liver is a large glandular flatted body, lying horizontally in the upper part of the abdomen, where it covers the stomach; but the thickest portion is in the right side, the stomach being situated under its left wing. Its function is to secrete the bile, which it discharges through the bile duct into the intestines below the stomach.

LUNGS. The lungs, or lights, are composed of two parts, called the right and left lobes, which fill nearly the whole cavity of the thorax. The lobes are separated from each other, by the mediastinum, a membrane which divides the thorax into two lateral chambers. The lungs are full of little cavities called air-cells; into these the air rushes during inspiration, and its vital part with some of its nitrogen, having combined with the blood circulating through the lungs, it is again discharged by expiration.

MOTION. This term is often technically used in this treatise, as synonymous with excitement and action.

MUSCLE. The muscles are the organs of locomotion; or the parts which move the body, or any of its members, from one place or position to another. Each muscle consists of a distinct portion of flesh, which is commonly red: its shape and size correspond to its situation and use; but in general the length very much exceeds the breadth and thickness: it is internally composed of fibres running longitudinally, which are consolidated together, at the ends, into the white solid substance called a tendon or sinew; and by these it is generally attached to the bones of the skeleton, which it moves by contracting longitudinally.

NERVE. The nerves are white solid cords, originating from the brain and spinal marrow, to which they are similar in appearances and properties, but more firm. Passing through the skull and spine in various places, they run into all parts of the system, continually dividing, as they pass on, into smaller branches, which are ultimately intermixed, or consolidated, with the minutest fibres in the system.

NISUS. This is a Latin term, which signifies an effort, exertion, or straining.

OLFACTORY. The nerves called olfactory, compose the organ of smelling. They are very numerous. They arise from the anterior part of the brain, and descending through the skull, they are distributed in the usual manner, on the membranes lining the nostrils.

ORBICULARIS, *of the eye.* This is the name of a thin muscle situated in the eyelids. Its fibres rise from the bones of the nose, near the inner corner of the eye, and running quite round the other corner, return to the place where they commenced. By their contraction the eyelids are closed.

OXYGEN. An æriform elementary substance. It is a constituent in the atmosphere, in which it is mixed, or feebly combined with nitrogen. In combination with hydrogen it forms water. It is also an essential ingredient in all the acids: and is likewise essential in its æriform state to the support of animal life and common combustion. When it combines with the blood in the lungs; or with a heated combustible material; it becomes more condensed, and discharges a part of the caloric with which it is combined in its aerial state; and it is this latent heat set free by respiration and combustion, which constitutes the sensible heat of living animals and common fire.

PANCREAS. An oblong, flatted, glandular substance, situated below the stomach, and designed to secrete a liquid serviceable in digestion.

PARALYSIS. A palsy; or loss of motion; or loss of the capacity for excitement.

PARENCHYMA. A soft, spongy, loose, infirm kind of substance, such as the brain or the lungs.

PATHOLOGY. The science which investigates the general nature of diseases.

PHYSIOLOGY. This term in its most extensive sense, may signify a treatise, or discussion, of any branch of physical science or natural philosophy. But it is generally used to signify a treatise on the animal economy, or the functions of the human organs and the principles of their animal life.

PRÆCORDIA. Literally it is the region before the heart. But we have used it to signify the region of the heart in general; or the parts situated in that region. These are, the heart itself; the lungs on each side and above; the diaphragm, or partition between the thorax and abdomen, on which the heart rests; and the liver and stomach immediately under the diaphragm.

PROXIMATE. Near. In the language of science, this epithet is applied to those principles, ingredients, or results, which are first obtained in a scientific investigation. Thus fibrin, albumen, and gelatin, are called the proximate principles of the blood, because they are the first developed in the analysis of that fluid; and the more simple elements are again developed from these by farther analysis.

PUPIL. The dark opening in the front of the eye, through which the rays of light pass in to the retina.

RETINA. This is an expansion of the optic nerve, and is the immediate organ of vision. The globe of the eye is a membranous sack distended completely by transparent liquids, called the humors of the eye. The optic nerve coming forward from the brain, enters this sack at its back part. The end of the nerve is then expanded into a nervous membrane, like a leaf with its stem in its centre, and thus lines all the inside of the eyeball, except the front part composed of the iris and pupil (which see). This nervous membrane, thus lining the interior of the eyeball, is called the retina, and is moderately thick and transparent. The rays of light, flying from every visible object. penetrate the transparent cornea and humors, and are by them converged to a focus on the retina, which they stimulate to visual activity.

SECRETION. The separation of a part of the blood from the whole mass, and the alteration of its chemical properties, by the insensible influence of the gland, in which the separation is effected.

SENSORIUM. Sensery. The brain; or the large medullary substance lodged in the cavity of the skull.

SIMULTANEOUS. Cotemporary, coexistent in time.

SKELETON. The bones of the human system connected together in their natural order.

SPASM. A cramp. An excessive and morbid contraction of a muscle. An excessive and inordinate degree of excitement of any kind.

SPECTRUM. A spectre: or a false perception of sight. In this treatise there are two kinds of spectra mentioned, the solar and the ocular When a sun beam passes through a prism, its constituent rays which produce the different colours, are refracted in different degrees; and if then received on a white surface, they delineate upon it the seven primary colours in their natural order and proportion; and this delineation is called the solar spectrum. An occular spectrum is that image of a bright object, which continues in the eye for some seconds after viewing it. When the image has the same colour with the original object, it is called a direct spectrum; and when different it is called reverse.

SPINAL-MARROW. A large nerve which descends from the brain through the hollow in the backbone.

SYSTEM. The human body is often styled, the system, by way of emphasis or pre-eminence.

SYNCHRONOUS. Concomitant, cotemporary.

TYMPANUM. The drum of the ear.

VEIN. The veins are the blood vessels which return the blood to the heart from the extremeties of the arteries. They run more superficially than the arteries; for a great many very large veins may be seen immediately under the skin. As they return from all parts of the system, they are continually joining each other, until they are finally reduced in number to one large tube in the greater circulation, which discharges its current into the right auricle. In the less circulation, the blood is returned from the lungs through several distinct veins which open into the left auricle.

VENTRICLE. The heart is a hollow muscular body situated in the mediastinum immediately over the diaphragm. Its cavity is divided by a muscular partition into two lateral chambers, termed the right and left ventricles.

J. A. Grimes, printer,
Richmond, K.

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